FOOD INDUSTRIES

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DECEMBER, 1937

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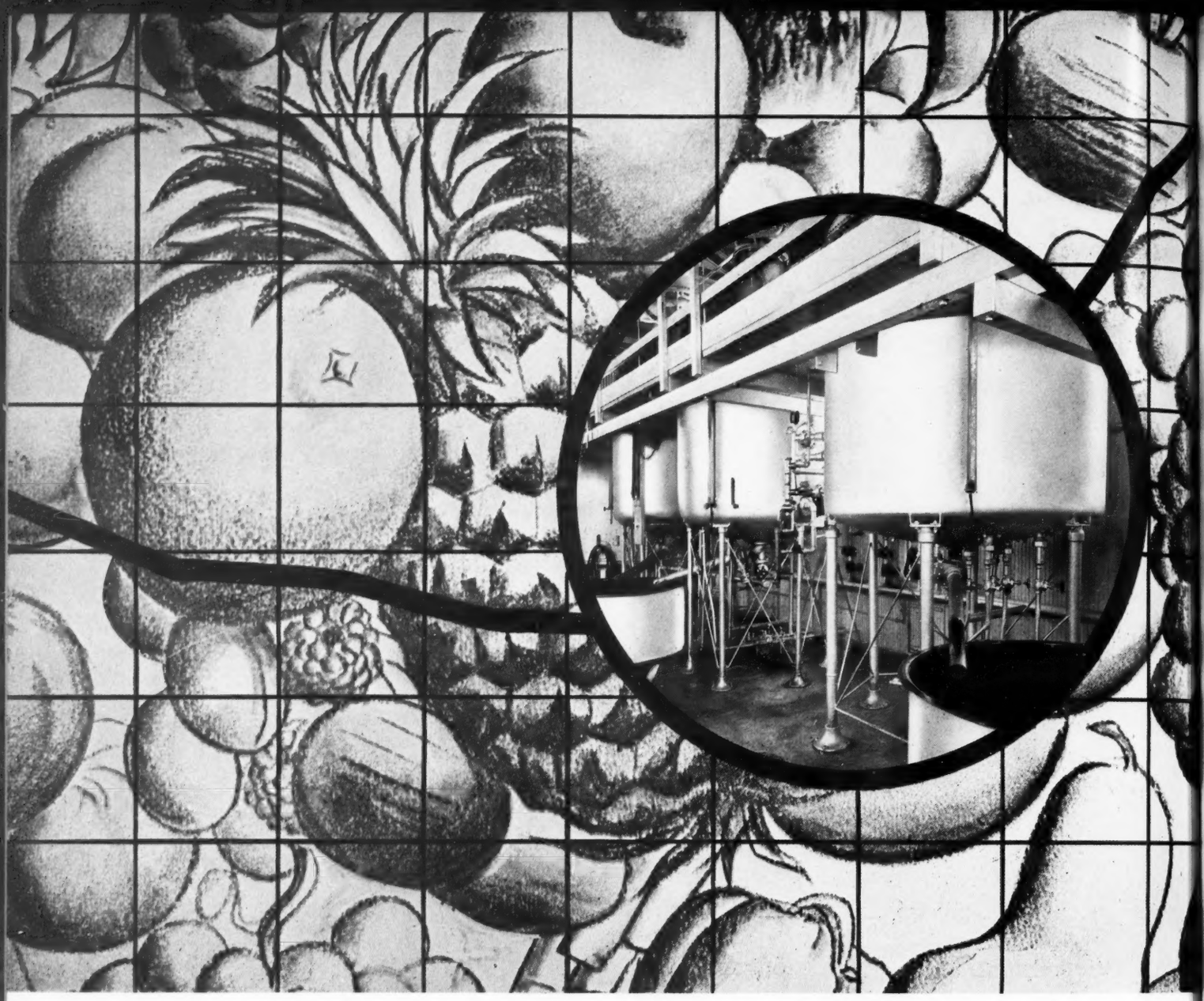

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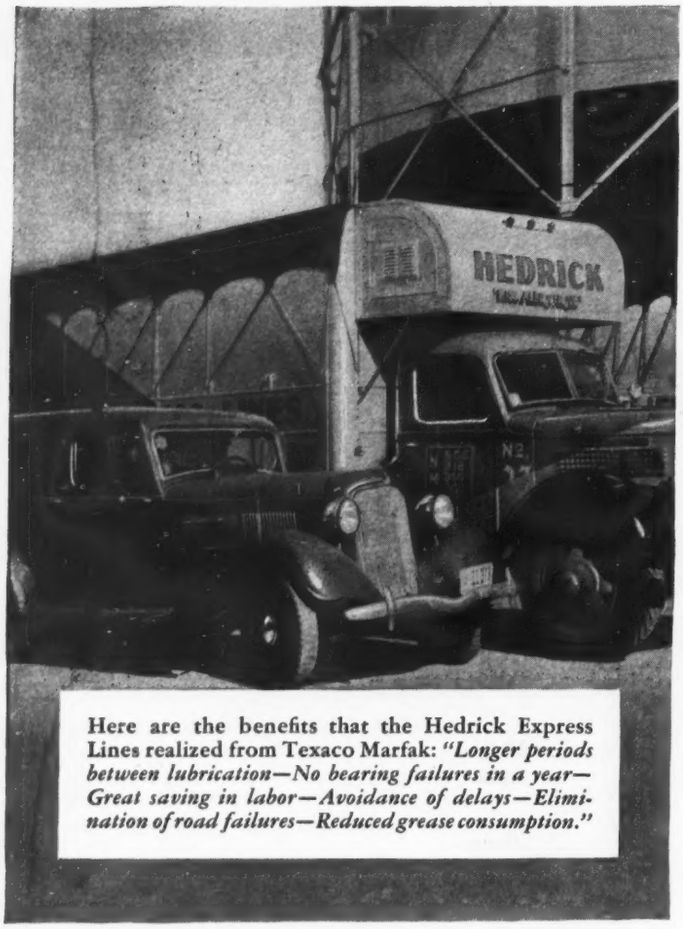
A MILLION MILES ON *"The Southwest's Fastest Fleet"*



Here are the benefits that the Hedrick Express Lines realized from Texaco Marfak: *"Longer periods between lubrication—No bearing failures in a year—Great saving in labor—Avoidance of delays—Elimination of road failures—Reduced grease consumption."*

To keep piston rings efficient, free from sticky, gummy deposits, that burn into hard carbon, fill the crankcase with NEW TEXACO MOTOR OIL. Refined by the Furfural Process, New Texaco Motor Oil is all lubricant . . . crankcases stay full longer.

RUNNING FROM ALBUQUERQUE, NEW MEXICO, through El Paso and Gallup, to Denver, the trucks of the Hedrick Express Lines must withstand constant, gruelling service in severe weather.

Hedrick uses Texaco Marfak for wheel bearing and chassis lubrication.

From actual operating data on trucks running more than 50,000 miles per year, this operator has recorded an annual saving of $48.30 per truck . . . or $2,415 for the entire fleet. Mileage between lubrication jobs has been increased more than *three times,* bringing still further savings in labor and lubricant costs. The annual costs of parts replacements, labor inspections, and time lost, greatly reduced. Putting your fleet on Marfak is a first step toward better performance and greater operating economy.

The Texas Company, 135 East 42nd Street, New York City.

TEXACO

REG. T. M.

TEXACO *MARFAK*

FOOD INDUSTRIES

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Established 1928—McGraw-Hill Publishing Company, Inc.

Vol. 9, No. 12

Laurence V. Burton, Editor

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DECEMBER 1937

The Talk of the Industry

» BUSINESS is still waiting for Mr. Roosevelt to be the first to admit that some of his policies may be wrong.

» ONE OF THE MOST UNUSUAL EVENTS OF THE YEAR was a luncheon in the Rat Laboratory of Pennsylvania State College—a luncheon to which we were fortunate enough to receive an invitation at a time when we could attend.

Ordinarily a rat laboratory is pervaded by odors of a type other than those ordinarily arising from a tableful of hot foods, but this one was fresh and wholesome.

In addition to enjoying the good fellowship of Deans Whittemore and Warnock, Professors Dutcher, Miller and Triebold, and others, including a number of graduate students, we made an astonishing discovery. Not only were the nutrition chemists good scientists, they were also actually good cooks! Which is to be regarded as the acme of perfection. But it is such a deviation from tradition that it almost seems like cheating.

» TO FIND NUTRITION CHEMISTS who know how to cook reminds us of our war-time experiences in the Food and Nutrition Division of The Sanitary Corps. In some unaccountable manner we were commissioned as nutrition specialist along with a group of real specialists who really knew their stuff. Yet, aside from August Wussow, now in charge of production of Price Flavoring Extract Co., and this department, most of the real specialists were spare men—even lean men—suggesting a marked personal unfamiliarity with the joy of eating. That is what we would call conforming to the truly traditional way of life!

» SALES PROMOTION NOTE: Consumers Union of United States, Inc., recently sent us a letter inclosing a pamphlet which says a family can save $7.20 a year by changing from Franco-American to Campbell's soup. Bet that makes Franco-American-Campbell Soup Co. mad. But Campbell doesn't get the break on tomato juice, for C.U. recommends saving $1.20 a year by changing from Phillip's to College Inn Tomato Juice. How about it, Colonel?

» ONE WOULD ALMOST BELIEVE that Mr. Charles E. Bedaux is not very popular with labor. Which reminds us of the new production manager who was recently hired to reduce production costs. He installed the Bedaux system, and promptly the whole outfit walked out, at the very beginning of the rush season. One of the heavy stockholders in the enterprise—a big outfit—phoned us to ask if we had any suggestions as to what to do next.

Believe it or not, there was one capitalist who was in 100 per cent agreement with organized labor.

» JUST IN CASE there are any other big shots who are seeking our advice on heavy matters such as how big a lock to put on the barn door after the mare is gone, may we cautiously suggest that we have a quaint notion that the best time to talk it over is about four months before anything happens.

» WOODROW WILSON once told Franklin Roosevelt about a man who "rushed downstairs, out the front door, mounted his horse, and rode off in all directions." He told

it to a lot of other people who have remembered it, and it just may be that before long Mr. Roosevelt will remember it and tell it to Henry A. Wallace. And perhaps to Cordell Hull. And to the Tariff Commission.

There is a suggestion which comes very earnestly from some outstanding Democrats, notably from Representative Harry B. Coffee, of Nebraska. Not quite so crudely as in the Wil-

son story, but by piecing his suggestions together one gets the idea.

Take this matter of corn loans, designed to keep the price of corn high. One might think that if the farmers of the country would be ruined by cheap corn, they would be in clover if the price of corn were high. Corn being such a heavy crop, this would be true if corn were sold and consumed as corn. But, as Mr. Coffee points out, 90 per cent of the corn crop every year is "marketed through livestock, and as a consequence the average farmer is more interested in the price of cattle and hogs than he is in the price of corn itself."

And somewhere or other there is a chap or two in the agricultural business who feeds corn to chickens —and ducks!

As a matter of fact, about 70 per cent of the corn crop every year is turned into meat before it crosses the county line.

The most direct price ratio is recognized as that between corn and hogs.

"The price of hogs and fat cattle will finally determine what the feeder can pay for corn," Mr. Coffee declared in a recent radio address. "If the feeder knew today that he would be able to get a good price for his fat cattle, lambs and hogs, there would be no such pressure to lower the price of corn or feeder cattle in the West as has recently occurred."

Nor, it might be added, would there be a crusade by the chain stores right now to get folks to buy grass-fed beef, at a much lower price, thus depriving the farmer who does sell corn of customers, and, perhaps, permanently affecting corn consumption.

Mr. Coffee also complains bitterly of the million-pound-a-week imports of cooked and boned hams, chiefly from Poland.

"This is the equivalent," he says, "of the hams of over 60,000 hogs per week. These hams have been selling at wholesale in New York City for about 40 cents a pound. The tariff is only 3¾ cents per pound—too low to preserve the domestic market for the American corn and hog producer."

Maybe Coffee should tell this "rode off in all directions" story to some of his colleagues who have been urging higher corn loans!

Avoid Compensatory Taxes

IF YOU ARE A USER OF PAPER BAGS, single-wall or multi-wall, or if you use any packaging materials which by any stretch of the imagination can be considered as substitutes for cotton, be sure to do your utmost to avoid the imposition of a special tax on them. For if Secretary Wallace has his way there will be a processing tax on cotton before very long—perhaps even before this page is published. And if it follows the previous pattern there will also be compensatory processing taxes.

During the days of the first attempt at cotton control and benefits to growers, many a manufacturer was forced to pay a compensatory tax on paper containers even though he had never used a cotton bag in his business life. In theory, however, the law figured that he *might* have used them, so he should pay the compensatory tax.

If cotton control is again to be imposed, it is only right and reasonable to exempt the users of competing materials who never have used any cotton. If this problem applies to your business be sure to bring pressure to bear on your Senators and Representative.

Papain, A New Culinary Material

PAPAIN, AN ENZYME from the tropical fruit of the papaya, is coming onto the market under several names, Tendra, Sofna, Delicia, and meat Tenderizer, and may have interesting possibilities if it gains a widespread consumer acceptance. It is a proteolytic enzyme possessing the power to convert most proteins into peptones or, in layman's language, it will digest meat.

A few experiments with it in our own kitchen indicates that it really has the remarkable property of mak-

Hors d'Oeuvres

• Life begins at 60 for those who chew Passion Gum, put on the market by South American Sapodilla Co., way down in Detroit. The gum is alleged to stimulate glandular activity. "One stick at a time usually satisfies." So says the modest advertising message. The price is $1 for five sticks. But if it works as advertised, it's cheap at twice the price.

• *Japan's little good-will excursion into Shanghai has created a serious shortage in some grades of teas exported from that point. Which probably explains why the British are not in sympathy with the friendly neighbor act of the Nipponese.*

• Irradiated coffee will be produced in Vancouver. Find for the world just one more source of vitamin D and the sun can be turned off.

• *Here's how to judge beer, on the authority of United Brewers Industrial Foundation: "The taste should be fresh, clean as a rain-washed field of ripening grain. There must be the full wholesome flavor of barley malt with a high overtone carrying the racy bitterness of hops . . . A million pinpoint bubbles give forth . . . forming not foam, but a fine creamy collar. Breathe deep of the aromatic essence, touch the foam to the tip of your tongue. Is it smooth? Does it tingle to the touch?"—Boy! What a brew!*

• The things that make a theatrical program successful will put over a business program, says an authority. These things are mystery, conflict, beauty, color, sex and personality. You can get the beauty, color, sex and personality by picturing fancy femmes in your ads. The mystery comes in when the consumer tries to figure out how the product justifies your advertising claims, and the conflict arises when you try to sell her a second package.

• *When jam runs through the holes in your bread onto Willie's new suit, blame the long, narrow pan. That is what Raymond Stritzinger told bakers at the recent ABA convention. Maybe the Holes-in-Bread Club ought to change its name to the Society for the Prevention of Jam Running through Holes in Bread onto Willie's New Suit.*

• The mass of the people knows the importance of keeping milk pure, says the dairy industry. It's well that purity is taken seriously in some form.

• *It is reported that a process has been invented whereby the Japanese will be able to use shark oil as a lubricant in airplanes. The Chinese always have felt that sharks and Japanese had something in common.*

• Tea distributors are asking the question: "Why do we drink so little tea in the United States?" That's an easy one: Because we drink so much coffee, milk, beer, wine, soft drinks and ice water.

• *An exhibit of the honeys from 50 foreign countries was a feature of the International Beekeepers' Congress held recently in Washington. Such an exhibit is featured nightly at the new International Casino in Times Square.*

ing tough meat tender. On one occasion we have had the rare delight of being able to cut a broiled two-inch steak with the side of a fork, the said steak having been purchased in an ordinary butcher shop.

But papain is potent stuff. It works with amazing rapidity and if too long a time elapses between spreading the juice on the meat and cooking it, the softening may proceed too far. Under such conditions the meat may become undesirably soft. About ten minutes application to meat at room temperature seems to be right. When meat is very cold, it seems to need a longer time to penetrate an inch.

What a general public use of papain would mean to the meat packing industry is anybody's guess. Yet there is every reason to believe that nobody will suffer if cheap cuts of meat are made more palatable and tender.

Up to now the restaurant trade seems to have shown the most interest in it. So, if you discover hat you can buy a better piece of meat when you are eating out than you can get at home, there may be a reason.

Extreme Accuracy Is Costly—Do You Need It?

ONE WAY TO SAVE CONSIDERABLY on the initial cost of industrial air-conditioning equipment is to make a really adequate study before specifying the exact conditions to be met. The usual procedure of the food manufacturer is to discover some set of satisfactory conditions with respect to humidity, temperature, rate of air movement, etc.—a combination of conditions which will prove to be acceptable for good industrial operations.

Then the next step is to specify that the new air-conditioning equipment must hit those conditions, right on the head! Often no allowance is made for permissable variations, just because nobody knows the limits within which satisfactory conditions can exist. As a result the equipment maker has to figure on a job that will exactly meet the specifications. And extreme accuracy costs money whether it be for metering, pressure measurement, time measurement, space measurement or for air conditioning. The equipment makers cannot be expected to inform the food manufacturer of the proper conditions to be met. It's just the other way around. The food manufacturer is supposed to know his own business.

Hence to obtain the maximum value for the dollar invested in industrial air conditioning, any invitations for bids should be preceded by a complete study of the maximum variations that will be acceptable. In this way there is a possibility of considerable savings to the food manufacturer.

Time to Plan

IF HOSTILITIES on a huge scale should break out, whether the United States were involved or not, the demands on the productive capacity of the food industries would be very great. Should this occur, what plans have you to meet a wartime demand? Would you need more equipment or would you run a double shift. If the latter, where would you get your supervisory employees? Would the necessary help be available? Would you plan on using many more women than now? Is your plant properly laid out or equipped to employ a larger percentage of women? Are your boilers now steaming at capacity? Would you need more of them? What about water supply, sewage facilities, waste disposal, supply of purchased power?

These and countless other questions are deserving of many a manufacturer's attention right now. And don't overlook the fact that some industries may be unable to purchase raw materials on the ground that its products may be ruled out by some governmental board. What would your business do then?

As long as Mr. Roosevelt is toying with the idea of chastising the racketeering nations of the world, there are quite a few things to think about.

The Outlook for 1938

A MUCH UNDERESTIMATED FACTOR IN BUSINESS is that intangible force called sentiment, mass optimism or mass pessimism. Everybody seems to get it at the same time, and business swoops up or down in accordance with this mass psychology. What may be the basic causes of our changes of sentiment is a matter of great importance. But it cannot be discussed here. The fact remains that the individual behavior of mankind is still ruled by the emotions and not by logic and reason.

In the United States we are afflicted with a set-up or a national temperament that is peculiarly volatile. Either we shove the accelerator to the floor-boards or we apply the brakes so hard that we lock the wheels and skid. We lack moderation.

Under such conditions, to talk of reasons and facts to the business men of the nation when they are afflicted with the jitters is not likely to induce a reasoned response. Nevertheless, a study of the underlying facts is in order.

As far as the consumer-goods industries are concerned, there is little to fear. Food consumption in 1938 will be about as much as it was in 1937. Raw material costs will be a little lower, and prices will be down a trifle unless the Federal monetary policy goes decidedly inflationary. Profits in 1938 will be a little slimmer than 1937 profits because of higher labor costs, declining inventory values and processing taxes.

In short the food business has relatively little to worry about except that profits will be a trifle harder to make. Our guess is that second and third-quarter profits in 1937 will be a fair index of what you can expect.

When we look at the capital-goods industries, however, there is a different picture. Under the threat of wage increases, in July the railroads stopped nearly all buying. Their purchases are today at the 1932 level. Residential building is back at the 1932 level. In steel, the new orders in March, 1937, represented 125 per cent of productive capacity. In October, new orders represented only 35 per cent of capacity. Such is the rapidity of the effect of changed sentiment.

Without being Pollyannaish it seems fair to state that the worst is probably over. At least, the bottom is behind us. These facts were not known, save to the very few, in September. Even today they are not widely understood.

To be sure there will be some who may be alarmed when they know the facts—like a man we once saw who cut himself without realizing it, and promptly fainted when his attention was directed to the blood on his hand.

With suitable revision of the tax laws, the current recession will be greatly minimized. And with a change of this mysterious thing called sentiment, the down-trend will be completely reversed. If there is really to be a business recession, it is likely to be short lived—like 1924 or 1926.

What the Exposition of Chemical Industries *Means to YOU*

IF THE CHEMICAL SHOW, as it is commonly known, were thought of as an exposition of the process industries instead of as the exposition of the chemical industries, it would perhaps have a name more understandable to the food industries.

For food manufacturers will find that it is just as much a food processing equipment show as a chemical processing equipment show. Indeed, a considerable number of the equipment folks exhibiting there will be found to be people who were first serving food manufacturers and are now serving both chemical and food manufacturers. Sometimes it is the other way around.

How to Visit the Show

WHEN VISITING the Chemical Industries Exposition at Grand Central Palace in New York during the week of Dec. 6, there are two ways to go about it. One way—the commonest method—is to walk through and try to see everything in sight. Which cannot be done in a single evening.

The other way is to plan your visit with a view to finding out what new equipment is on hand to help you solve your problems. With the aid of the "preview" on this and the following pages, you can make sure that you don't miss anything that is of significance.

Most of the firms who exhibit at the Chemical Show are firms which are thoroughly familiar with the Unit Operation concept. As a rule, the equipment builder is less concerned with what materials you are treating than with what you are doing to these materials. He can often help you do a better job. And he will talk to you about the operation more than about your particular food.

Hence it is strongly urged on every food-production executive who visits the show to approach the exposition with certain unit operations in mind. Naturally, these will be the unit operations which you will use or have been using in your own plant.

How to Spot a Unit Operation That Needs Improvement

IF EVERY OPERATION in your plant is running perfectly and under positive control—going at top speed with never a miss—then, there is considerable probability that such operations are not easily improved.

On the other hand, if a unit operation such as grinding, mixing, or drying, for example, is slow, gives trouble or does not turn out uniform products, it is probably a unit operation that needs a lot of improvement. If it is difficult to control, if it costs a lot to operate, if the machinery gives you many a headache, then here is an operation that is susceptible to considerable improvement.

Or perhaps the old equipment is huge, cumbersome, takes lots of space, wastes much material, causes accidents and imparts bad flavors or off quality at times.

If any of the foregoing criticisms of an operation, or the equipment performing an operation, fit any part of your business, then here is the operation that will be most profitable to study at the Chemical Show.

In the pages which immediately follow a great deal of the equipment to be seen at the exposition has been classified according to the unit operation for which it is adapted or designed.* Hence it is suggested that you visit first those exhibits where your study of your own unit operations will show that you can expect possible improvement.

Controlling

AMONG THE PROCESS CONTROL INSTRUMENTS on exhibit may be seen a wide range in types for regulating not only temperature and pressure in food processing, but flow, liquid level and pH. Then there will be controllers for regulating various process variables in accordance with a time schedule. And also on display will be coordinated-process controllers which "synchronize," or tie together according to a desired sequence and time plan, the operation of individual instruments which control various variables of a process.

The following is a list of the things to see if you are looking for an answer to a control problem, either present or future:

(*a*) Demonstration set-up of a coordinated process control.

(*b*) An electric flow meter with an integrator for totalizing the flow.

(*c*) A pyrometer temperature controller with a 0 to 500 deg. range useful in foods.

(*d*) A reset air-operated controller.

BRISTOL CO., *Waterbury, Conn.*

Instruments for indicating, recording and controlling pressure, temperature, flow and humidity. Also a time-schedule control.

TAYLOR INSTRUMENT COS., *Rochester, N. Y.*

Chronoflo totalizing scale for automatically indicating and totalizing the flow on belt conveyors.

TOLEDO SCALE CO., *Toledo, Ohio.*

Recording and controlling equipment of Micromax design, CO_2 measuring and recording device and pH instruments (laboratory style).

LEEDS & NORTHRUP, CO., *Philadelphia, Pa.*

Indicating, recording and controlling instruments for temperature, pressure, flow, level and other variables.

C. J. TAGLIABUE MFG. CO., *Brooklyn, N. Y.*

Steam traps, temperature regulators, electric controls and water blenders with temperature of outlet water controlled.

SARCO CO., INC., *New York, N. Y.*

Instruments for controlling flow, pressure, temperature, level and draft at nearby

* The exhibits listed in this article include those about which advance information was given to Food Industries by the exhibitors.

or distant points, in process work or in the power plant.

BAILEY METER CO., *Cleveland, Ohio.*

Microscopes and other optical instruments used in research and control work.

E. LEITZ, INC., *New York, N. Y.*

Optical instruments for use in production control.

BAUSCH & LOMB OPTICAL CO., *Rochester, N. Y.*

Temperature, pressure or flow regulators.

BROWN INSTRUMENT CO., *Philadelphia, Pa.*

FOXBORO CO., *Foxboro, Mass.*

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Minneapolis, Minn.*

SARCO CO., INC., *New York, N. Y.*

Disintegrating

AMONG THE MACHINES to be seen at the exposition which accomplish the unit operation of disintegrating are grinders, crushers, pulverizers, cutters and attrition mills. There will be ball, roller, hammer, pebble and burr mills. And a pulverizer to be shown involves the principle of grinding the material upon itself. These machines will handle various types of foods ranging from soy beans to sugar.

Below are the disintegrating units to be displayed:

(*a*) Roller-bearing, saw-tooth crusher.
(*b*) Heavy-duty knife cutter.
(*c*) Disk grinder with built-in motor and cooling jacket.

ROBINSON MFG. CO., *Muncy, Pa.*

Bowl mill (for coal) and a roller mill, with whizzer-type separator, with a range from 80 per cent through 100 mesh up to 99¾ per cent up through 325 mesh.

RAYMOND PULVERIZER DIVISION, COMBUSTION ENGINEERING CO., *Chicago, Ill.*

Pulverizer which utilizes the principle of grinding the material upon itself. Recommended for use on sugar, soy beans, gelatines and many other products. Its capacity is 25 to 3,000 lb. per hr.

HURRICANE PULVERIZER CO., *Chicago, Ill.*

Various models and sizes of Micro-Pulverizers for disintegrating food materials and other products.

PULVERIZING MACHINERY CO., *Roselle Park, N. J.*

Ball and pebble grinding mills.

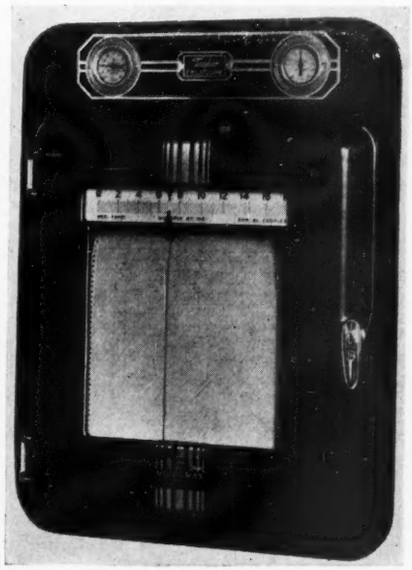
PAUL O. ABBÉ, INC., *Little Falls, N. J.*

Attrition mills, cutters and roller mills for use in grain-products and other industries.

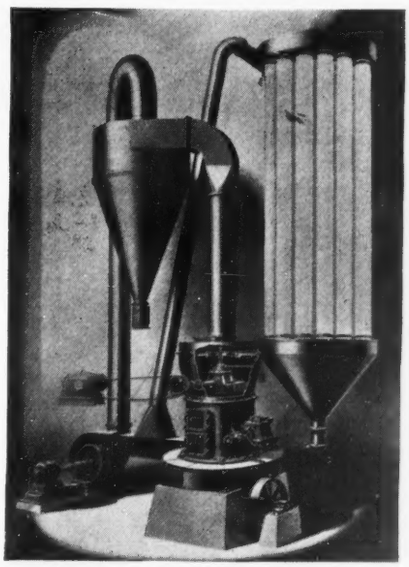
SPROUT, WALDRON & CO., *Muncy, Pa.*

Pebble mills, jar mills and cutters.

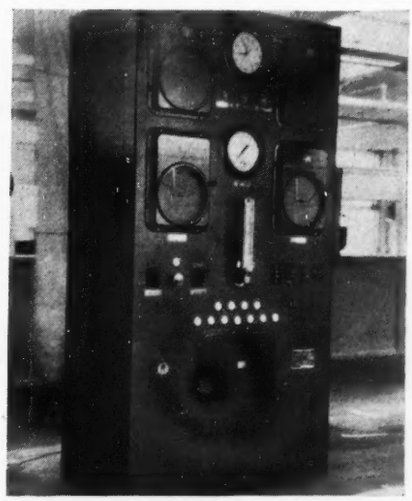
ABBÉ ENGINEERING CO., *New York, N. Y.*



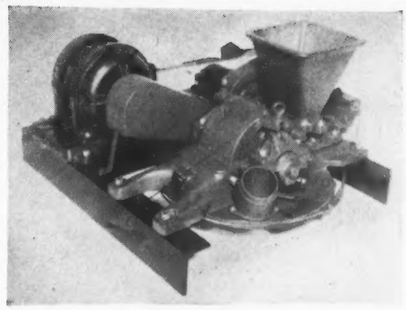
Recently introduced, this controller combines the accuracy of the Micromax potentiometer method of measuring, indicating and recording temperature with the smooth, proportional control-valve action of the Fulscope air-operated controller. It is a unit of Taylor Instrument Cos.



Raymond combination roller mill and whizzer separator for grinding and classifying materials. Fineness can be varied instantly between 100 to 325 mesh by shifting a lever.



Bristol's system of coordinated process control. Instruments operating individually to control such food process variables as temperature, pressure, liquid level and flow are coordinated and interlocked into a single control unit, so that they follow the correct processing schedule.



Various food products are being processed with the Mikro-Pulverizer of Pulverizing Machinery Co. Swing-bolt assemblies permit easy removal of parts for cleaning.

A new principle is utilized in this Hurricane pulverizer. A high-speed rotor throws the particles outward and they bombard each other into a powder. The machine also classifies the particles.

Drying

THE DRYERS which will be shown at the exposition serve a function similar to that of evaporators in that they remove water from foods. But they differ in design in that they are built to expose the product to air or vacuum in thin layers or films or in individual particles, because the final product which they produce is in solid form, with low moisture content. These machines are of several different types, including drum dryers for liquids containing solids in suspension, such as milk; spray dryers, also for milk; tray dryers and revolving-drum dryers for flake, granular and powdered products.

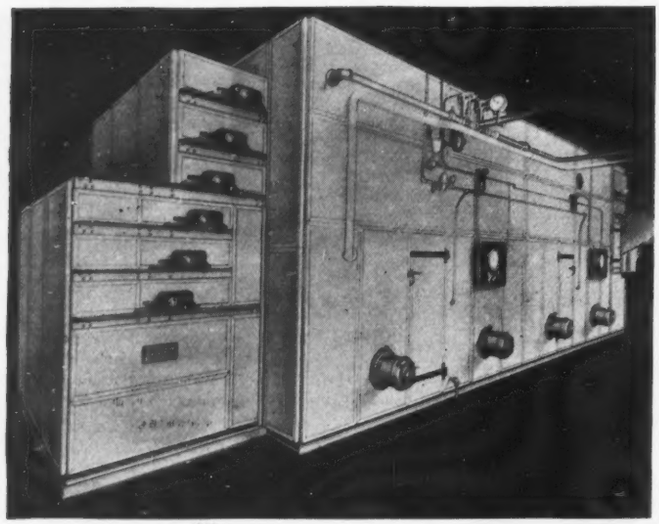
These are the units to be shown:

Double-drum dryer, operating at atmospheric pressure and equipped with an oscillating feed. This permits its use for drying a wider range of materials, including liquids having solids in suspension, which, without the oscillating feed would settle out and cause trouble.

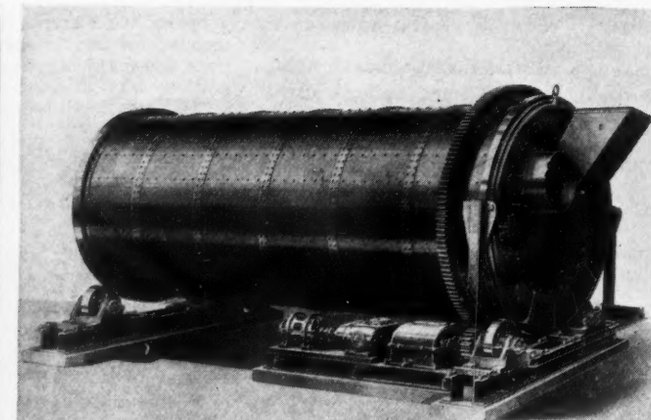
BUFFALO FOUNDRY & MACHINE CO., *Buffalo, N. Y.*

Double-drum dryer, laboratory model. Has only 2 sq.ft. of heating surface. It is equipped so that drums can be operated in opposite directions and it can be operated under vacuum or at atmospheric pressure.

BUFFALO FOUNDRY & MACHINE CO., *Buffalo, N. Y.*



Proctor & Schwartz reversing-pan dryer for materials which must be disturbed or agitated during the drying process. It offers high capacity in a relatively small space.



Roto-Louvre dryer to be exhibited by Link-Belt Co. It consists of a drum with longitudinal air channels at the inner circumference. As drum revolves, product tumbles over louvres of air channels.

Spray-drying chamber to be used in small plants for drying milk, etc.
BOWEN RESEARCH CORP., *Garwood, N. J.*

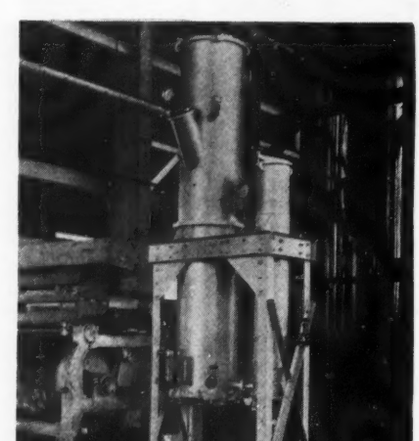
Roto-Louvre dryer, for processing granular materials.
LINK-BELT CO., *Chicago, Ill.*

Reversing-pan dryer, a two-truck dryer, 12-tray dryer, aero-form dryer and electrically heated laboratory dryers for foods and other products.
PROCTOR & SCHWARTZ, INC., *Philadelphia, Pa.*

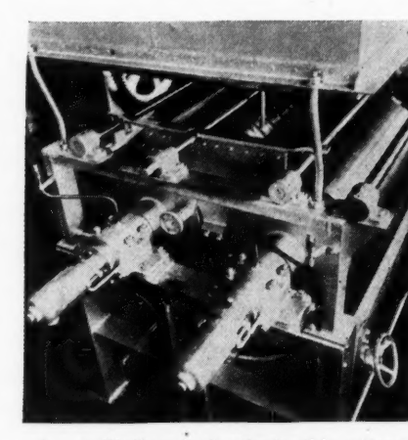
AMF-Crawford oven dryers (laboratory and industrial size), electrically heated.
AMERICAN MACHINE & FOUNDRY CO., *Brooklyn, N. Y.*

Portable laboratory and pilot dryer. It is of rotary cylindrical type, and is equipped with necessary controls and instruments for regulating and recording variables.
HERSEY MFG. CO., *So. Boston, Mass.*

Drying machinery.
LOUISVILLE DRYING MACHINERY CO., *Louisville, Ky.*



Stainless steel evaporator expressly designed for concentrating food products. Made by Buffalo Foundry and Machine Co., it has new features of design.



An oscillating feed adapts this atmospheric, double-drum dryer to the handling of products having material in suspension, which otherwise would settle out and unfavorably affect drying results. This oscillating-feed dryer is a development of Buffalo Foundry and Machine Co.

Evaporating

EXTREMELY WIDE is the range of applications in the food industries for the evaporators to be exhibited. No less than 47 different foods require evaporation in their processing, not to mention food derivatives that must be evaporated as byproducts of food manufacture. These foods range from apple butter to whey and include such high-production products as condensed and evaporated milk, baby foods, beef extract, candy, soups and tomato juice.

Below is a list of equipment for carrying out the unit operation of evaporation, which includes the evaporation of water from solutions or suspensions:

Stainless-steel evaporator designed for concentrating food products and other materials where sterile conditions must be maintained. Designed for improved recovery of solids by method of introducing vapor and liquid into a vapor separator which minimizes entrainment, even when handling foamy materials.
BUFFALO FOUNDRY & MACHINE CO., *Buffalo, N. Y.*

A trunnion-type steam-jacketed aluminum kettle.
ALUMINUM CO. OF AMERICA, *Pittsburgh, Pa.*

Forming

FOOD MANUFACTURERS who desire to distribute a product in the form of compressed cubes or tablets will want to see this exhibit:

Single-punch press for forming tablets or briquettes up to 4 in. in diameter and 1 in. thick. Can be used to form starch cubes, tea and coffee tablets, etc.
F. J. STOKES MACHINE CO., *Philadelphia, Pa.*

Heat Exchanging

EQUIPMENT for heating and cooling corrosive fluids will be a highlight of the exposition for those interested in the unit operation of heat exchanging.

This equipment includes:

Glass-pipe heat exchangers and finger, candle or batch-type coolers.
CORNING GLASS WORKS, *Corning, N. Y.*

Materials Handling

MATERIALS HANDLING, like packaging, is employed in every plant. And, as in the case of packaging, there will be many exhibits of this type of equipment. The units to be on display will include pumps, valves and fittings for handling fluids; belt and chain conveyors for solids in bulk or in containers, vibrating conveyors, bucket elevators and the Redler conveyor for solids. Then there will be hand-lift trucks, power stackers and floor trucks for handling boxes, bags, drums and pans. And also on

exhibit will be seen air compressors and blowers for creating a pressure differential sufficient to move materials through pipes. Lastly, devices for tilting carboys and drums will be shown.

In many food factories there is an opportunity for a reduction in the cost of moving materials through the plant. Equipment which makes this possible is included in the following list of that to be exhibited:

Fluids-handling equipment, including special-metal centrifugal pumps for handling corrosive liquids. One pump is an all-nickel unit. A two-stage air compressor for pneumatic handling systems, and a four-stage, steam-jet air ejector.
WORTHINGTON PUMP & MACHINERY CORP., *Harrison, N. J.*

Hand-lift trucks, power stackers and floor trucks.
LEWIS-SHEPARD CO., *Boston, Mass.*

Belt-conveyor idlers, antifriction type; conveying chains, etc.
LINK-BELT CO., *Chicago, Ill.*

Electric vibrating conveyor and a bucket elevator.
JEFFREY MFG. CO., *Columbus, Ohio.*

Redler conveyor, Redler elevator, belt conveyor idlers and box-car loader.
STEPHENS-ADAMSON MFG. CO., *Aurora, Ill.*

Valves and fittings, of ordinary and alloy metals, for handling fluids.
CRANE CO., *Chicago, Ill.*

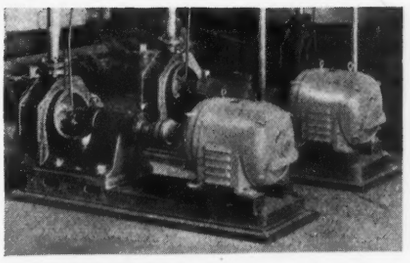
Spiral-woven conveyor belts for use in drying, washing and dewatering equipment.
KORB-PETTIT WIRE FABRICS & IRON WORKS, INC., *Philadelphia, Pa.*

Acidproof piping, valves, etc., of ceramic material.
U. S. STONEWARE CO., *New York, N. Y.*

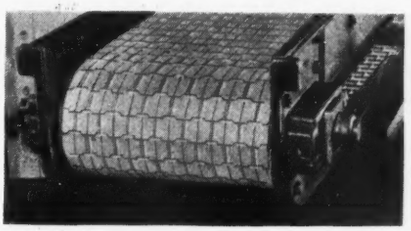
Drum and carboy filters.
STORMS-HARVEY EQUIPMENT CO., INC., *New York, N. Y.*

Electromagnetic feeder for handling material into screens, crushers and other equipment.
ALLIS-CHALMERS MFG. CO., *Milwaukee, Wis.*

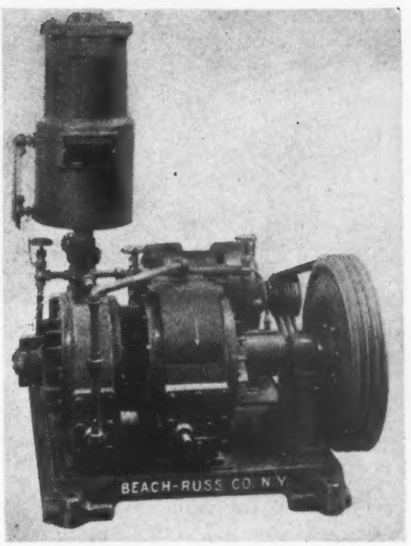
Rotary pumps, centrifugal pumps, vacuum pumps and positive-pressure blowers.
FOSTER PUMP WORKS, INC., *Brooklyn, N. Y.*



Worthington - Antaciron centrifugal pumps for handling corrosive substances in food plants.



Canners, bakers and other food manufacturers can effectively use this Acme "flat-top" Steelbelt conveyor. It is available in stainless steel and with perforated links.



Two-stage pump for producing a high vacuum. A Beach-Russ unit, its two stages are cast integrally, eliminating between-stage leakage.

Vacuum pumps, rotary pumps, blowers, gas boosters and centrifugal pumps.
BEACH-RUSS CO., *New York, N. Y.*

Vacuum pumps and specialty pumps for handling heavy, viscous liquids.
KINNEY MFG. CO., *Boston, Mass.*

High-vacuum pumps with capacities of 10 and 225 cu. ft. of air per minute. Will draw vacuum within fraction of millimeter of absolute. Equipped with oil clarifier.
F. J. STOKES MACHINE CO., *Philadelphia, Pa.*

Cranes
YALE & TOWNE MFG. CO., *New York, N. Y.*

Compressors
NASH ENGINEERING CO., *South Norwalk, Conn.*

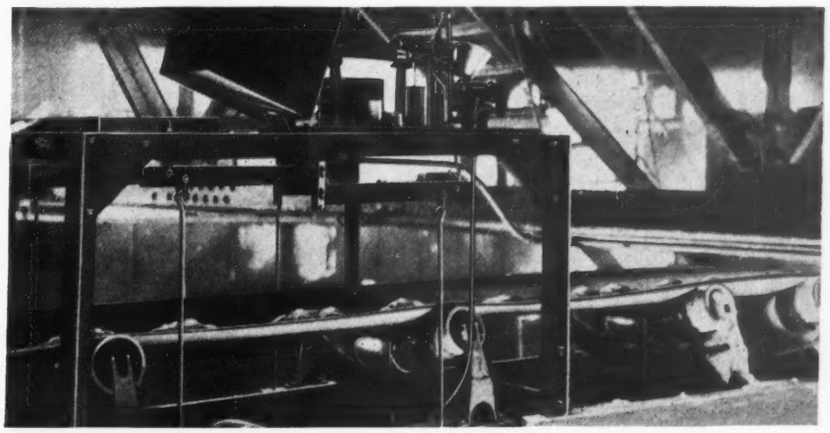
Pumps of acid-resisting material
DURIRON CO., INC., *Dayton, Ohio.*

Unnecessary losses through dusting are said to be eliminated by this Read Machinery Co. automatic weighing hopper. Quick-action gates, telescoping outlet and displaced-air vent prevent dusting.

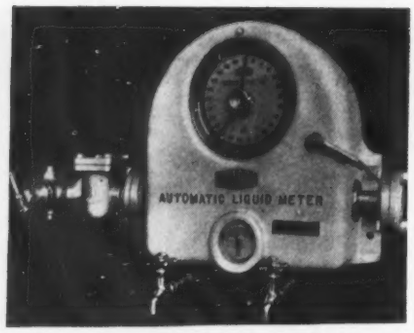
Measuring

THE EXHIBITS of measuring equipment to be seen at the exposition will not be as extensive as those of some other types of devices. But what there is will be important to the food processor, because his plant operations often involve the measuring or weighing of quantities of

Foodstuffs are protected by complete enclosure when handled through this Jeffrey-Traylor electric vibrating conveyor. The tube may be of glass, stainless steel, aluminum or mild steel. The capacity may be varied instantly.

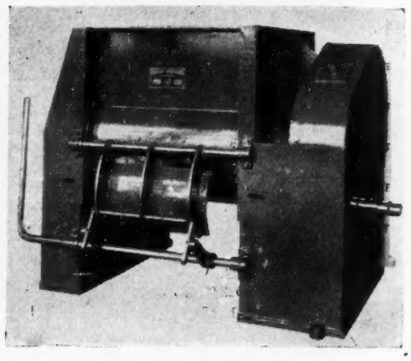


Bulk material is weighed in transit by this new conveyor scale of Fairbanks, Morse & Co.



To be exhibited by Read Machinery Co., this meter automatically cuts-off the flow of water after a predetermined amount has passed.

Foods can be mixed in this horizontal Sprout, Waldron mixer, which is equipped with a ribbon and paddle agitator. It is a standard unit equipped with roller bearings and provided also with packing glands.



Nontilting Baker-Perkins mixer with quick-opening bottom discharge door.

ingredients to be combined with measured amounts of other substances. Then, of course, the quantity of the material coming into and leaving a plant or department must be determined. Measuring and weighing devices which are a part of packaging machines are covered under the section on "Packaging". Those other than that are as follows:

Automatic water meter and "dustless" automatic weigh hopper for finely divided solids.
READ MACHINERY CO., INC., *York, Pa.*

Balances for laboratory use.
CHRISTIAN BECKER, INC., *New York, N. Y.*

Balances.
PFALTZ & BAUER, INC., *New York, N. Y.*

Mixing

PERHAPS NO SINGLE CLASS OF EQUIPMENT to be seen at the Exposition of Chemical Industries will have wider application in food processing than that for mixing. Because mixing in some of its several phases enters into the preparation and handling of nearly every food. Its various phases include agitating, stirring, heating, blending, diffusing, dispersing, emulsifying, homogenizing, kneading, whipping and working. These phases cover not alone the mixing of solids with solids, but the mixing of solids with liquid, and liquids with liquids.

In keeping with the wide application of the unit operation of mixing, there will be exhibited an extensive variety of machines, including ordinary mixers, homogenizers, colloid mills and blenders.

The mining machines to be shown at the exposition are indicated in the following list:

Trowel type mixer with sifter attachment.
ROBINSON MFG. CO., *Muncy, Pa.*

(*a*) "Lightning" laboratory mixer.
(*b*) Portable mixers, with both direct and geared drive.
(*c*) Closed-tank mixers for pressure and vacuum.
(*d*) Side angular mixers, which enter through side of tank.
(*e*) Vee belt and geared drive mixers.
MIXING EQUIPMENT CO., *Rochester, N. Y.*

High speed, rotating-disk homogenizer.
BOWEN RESEARCH CORP., *Garwood, N. J.*

Acidproof mixer of ceramic material, for syrups, beverages and other foods, in sizes ranging from 50 to 200 gals.
U. S. STONEWARE CO., *New York, N. Y.*

Small, motor driven mixer.
STORMS-HARVEY EQUIPMENT CO., INC., *New York, N. Y.*

Rotary mixers.
PAUL O. ABBÉ, INC., *Little Falls, N. J.*

New laboratory-model Charlotte colloid mills and other models of the Charlotte mills.
CHEMICOLLOID LABORATORIES, *New York, N. Y.*

AMF-Glen vertical-type bowl mixers and bowl unloader.
AMERICAN MACHINE & FOUNDRY CO., *Brooklyn, N. Y.*

AMF-Triune blender and sifter for premixing and blending dry materials, sifting them and discharging them to mixers.
AMERICAN MACHINE & FOUNDRY CO., *Brooklyn, N. Y.*

Industrial and laboratory mixers of the two-arm type.
READ MACHINERY CO., INC., *York, Pa.*

Mixers with ribbon and paddle agitators.
SPROUT, WALDRON & CO., *Muncy, Pa.*

Abbé-Lenart standard mixers and paste mixer.
ABBÉ ENGINEERING CO., *New York, N. Y.*

Colloid mills.
PREMIER MILL CORP., *Geneva, N. Y.*

Mixers and agitators.
PFAUDLER CO., *Rochester, N. Y.*
MIXING EQUIPMENT CO., INC., *Rochester, N. Y.*
STRUTHERS-WELLS CO., *Warren, Pa.*

Packaging

EVERYONE HAS PACKAGING PROBLEMS, because packaging, packing and shipping are "universal" in the process industries. So it is not surprising that many exhibits will feature equipment and containers designed to meet such problems. There will be displayed automatic machines for filling liquids, semi-liquids and powdered or granular solids into bottles, jars, tubes, bags, multi-wall valve paper bags, barrels

Originally developed for beer, this aluminum barrel has been equipped with screwed fittings. It will be exhibited by Aluminum Company of America.

Parallax is eliminated in reading exact weight of food packages by the Shadowograph, to be put on display by Exact Weight Scale Co. The shadow of the needle is projected on a scale.

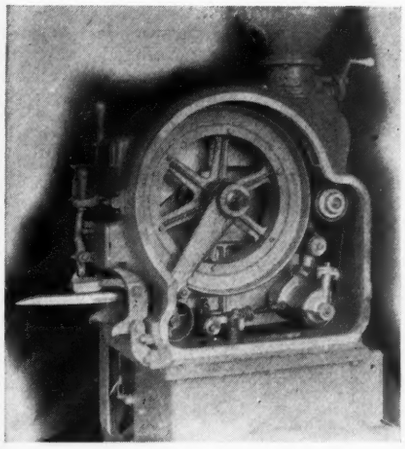
and drums. There will be cleaning machines for new glass containers; forming, filling and sealing machines for transparent-cellulose bags; labelers; carton and can packers; wrapping machines; and what not. Paper bags, shipping drums and steel-strapping equipment also will be shown.

A detailed list of the packaging exhibits follows:

Aluminum shipping drums and a beer-barrel type of shipping container.
ALUMINUM CO. OF AMERICA, *Pittsburgh, Pa.*

Steel shipping barrels.
STEVENS METAL PRODUCTS CO., *Niles, Ohio*

(*a*) Bar-Nun "auto-check" weigher for opening, filling, weighing and checking bags.
(*b*) Vi-Brox barrel packer and a Vi-Brox carton and can packer. These are machines for shaking down the fill.



This automatic filling machine for multi-wall paper valve bags makes that type of heavy-duty shipping container available for granular and crystalline food products, such as sugar and salt. It will be displayed by St. Regis Paper Co. It is shown here with cover plate removed.

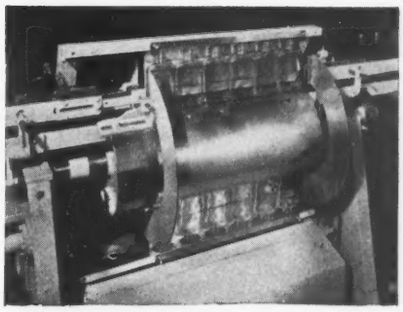
(*c*) Draver volume percentage feeders for packaging.
B. F. GUMP CO., *Chicago, Ill.*

Barrels and drums for food products. Also other metal containers.
PRESSED STEEL TANK CO., *Milwaukee, Wis.*

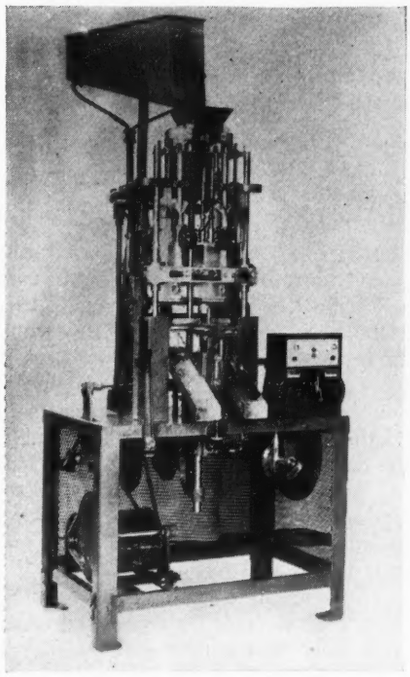
Waytrol constant-weight feeder and an electric vibrating spreader feeder.
JEFFREY MFG. CO., *Columbus, Ohio.*

Paper bags of various types.
UNION BAG & PAPER CORP., *New York.*

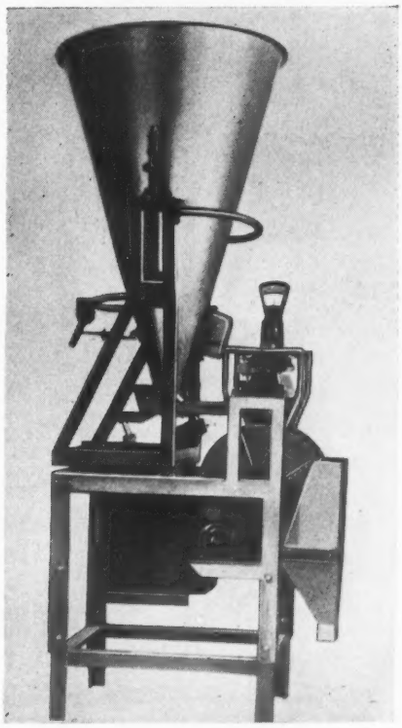
Two-stream Vari-Visco filling machine, combination bottle-cleaning and filling ma-



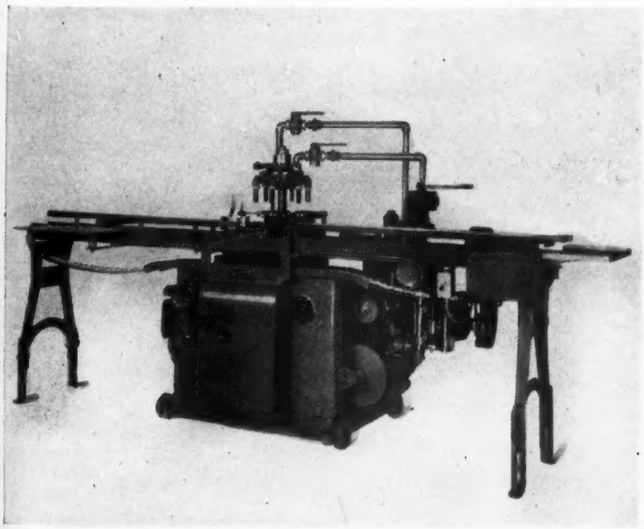
Glass containers are turned upside down for efficient cleaning by this unit of Pneumatic Scale Corp.



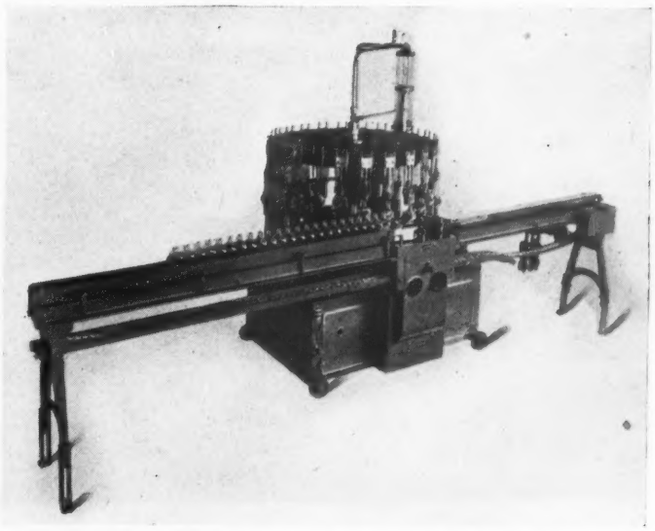
Transparent-cellulose packages are formed, filled and tightly sealed at the rate of 60 a minute by the Transwrap machine of Stokes & Smith Co. The machine was developed originally for packaging candy.



Vibrating feeders are used for accurate filling in this Syntron rotary batch weigher, being controlled by a scale.



Semi-liquid foods, such as mayonnaise and jelly, are filled at the rate of 150 containers a minute in the two-stream Vari-Visco filler to be shown by Karl Kiefer Machine Co.



High-speed production is a function of this 24-head Kiefer automatic rotary vacuum filling machine. The vacuum plant is built-in. The machine has one-point lubrication.

chine; tube-filling and closing machine.
KARL KIEFER MACHINE CO., *Cincinnati, O.*

Filling, weighing and sealing machine for powdered and dry materials. Also a machine for tight-wrapping in aluminum foil and another for forming, filling and sealing transparent-cellulose packages.
STOKES & SMITH CO., *Philadelphia, Pa.*

Detergent for cleaning cans, bottles and jars, as well as floors and equipment.
PHILADELPHIA QUARTZ CO., *Philadelphia, Pa.*

Bags.
BEMIS BROS. BAG CO., *St. Louis, Mo.*

Glass containers.
OWENS-ILLINOIS GLASS CO., *Toledo, Ohio.*

Filling machines.
SYNTRON CO., *Pittsburgh, Pa.*

This machine opens, fills, weighs and check-weighs 18 to 25 bags a minute. It handles even finely ground or pulverized foods. It will be shown by B. F. Gump Co.

Power Application

THERE HAVE BEEN some changes in the devices for transmitting power from motors to machines since the last exposition of the chemical industries, and the new developments will be on exhibit at the exposition.

Everyone interested in power application apparatus will want to see these exhibits:

Various designs of variable-speed transmission.
REEVES PULLEY CO., *Columbus, Ind.*

PIV gear variable-speed transmission; also speed reducers.
LINK-BELT CO., *Chicago, Ill.*

Electrical equipment and supplies.
GENERAL ELECTRIC CO., *Schenectady, N. Y.*

WESTINGHOUSE ELECTRIC & MFG. CO., *East Pittsburgh, Pa.*

Separating

THE UNIT OPERATION of separating from foodstuffs various constituents and impurities is about as widely used as its opposite, mixing. And as would be expected, the types and numbers of separating machines to be on display will be quite extensive. At the many booths will be seen equipment used in the dairy, sugar, salt, flour, cereal, baking powder, honey, fats and oils, confectionery, canning, meat packing, beverage manufacturing and other food industries.

These machines will range from the prosaic centrifugal for separating cream from milk to magnetic pulleys for removing stray nuts, bolts, nails or screws from food products. The entire group of "separators" includes, in addition to centrifuges and magnetic separators, pressure filters, sifters, screens, riddles, air classifiers, air washers, stills and thickeners for handling sewage.

Here is a list of what there will be for you to see if you are looking for something efficient in the line of separating equipment:

Single-deck, motor-driven gyro sifter.
ROBINSON MFG. CO., *Muncy, Pa.*

Aluminum pump and filter unit.
ALUMINUM CO. OF AMERICA, *Pittsburgh, Pa.*

(*a*) 30-in., bottom-discharge centrifugal, with rubber-covered basket and curb, and a two-motor drive.
(*b*) 48-in., bottom-discharge centrifugal with stainless-steel basket and unloading plow.
(*c*) 17-in., high-speed (2,650 r.p.m.) centrifugal, exerting force of 1,500 X gravity.
(*d*) 30-in., bottom-discharge stainless-steel basket and 17-in. Monel metal basket.
ROCHESTER ENGINEERING & CENTRIFUGAL CORP., *Rochester, N. Y.*

Mechanical air separator for separating and classifying powdered materials, equipped with whizzer device that accelerates separation, insures greater uniformity of the fines and increases output.
RAYMOND PULVERIZER DIVISION, COMBUSTION ENGINEERING CO., *Chicago, Ill.*

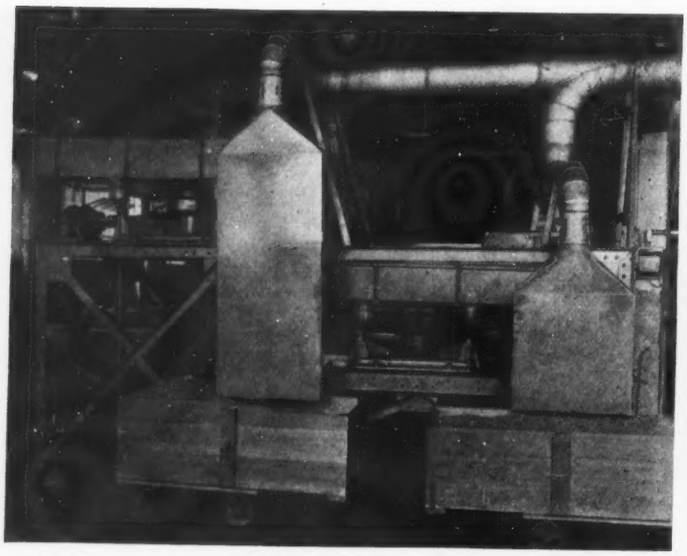
Filter aids for clarifying such products as oil, sugar syrups, glucose, honey and cereal beverages.
JOHNS-MANVILLE, *New York, N. Y.*

Selectro vibrating screen of "sanitary" type. It is made of stainless steel and has no cracks or crevices in which material may lodge. It is built for easy cleaning.
PRODUCTIVE EQUIPMENT CORP., *Chicago, Ill.*

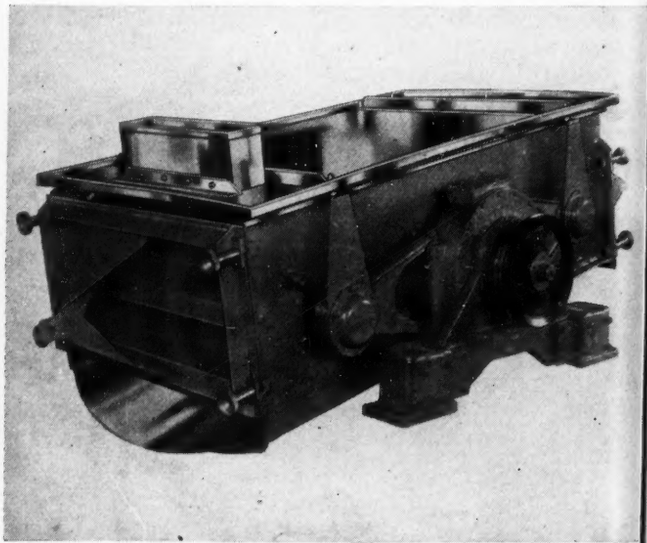
Testing sieves and riddles, sieve shaker and nested sieves in all meshes and metals.
NEWARK WIRE CLOTH CO., *Newark, N. J.*

Venturi washer-scrubber-concentrator-absorber for scrubbing gas by a fine spray against wetted surfaces on which the gas and water are pressed by centrifugal force. This compels combination between either

(*Turn to page* 740)



A high-capacity sifter for fine or coarse products is this Perfect Circle unit of Sprout, Waldron & Co. It is pictured here in a chocolate plant. The sifter has accurately controlled circular motion, from which it derives its name.



Made of stainless steel and containing no cracks or crevices, this Selectro vibrating screen is particularly suited to handling food products. Stroke and angle are adjustable. It is to be shown by Productive Equipment Corp.

FLOW DIAGRAMS *of Food Processing*

Flow Diagrams of Food Processing

In the following pages are presented flow diagrams showing the principal unit operations involved in the manufacture of these seven foods:

Baking Powder — Catchup
Bread — Gelatine
Carbonated Beverages — Malt Syrups
Edible Vegetable Oils

This is No. 1 in a series of flow diagrams for food engineers

A NEW SERIES OF FLOW DIAGRAMS of the procedures and methods involved in food manufacture is inaugurated in this number of FOOD INDUSTRIES. On the pages which follow will be found diagrams covering the production of Baking Powder, Bread, Carbonated Beverages, Catchup, Gelatine, Malt Syrups, and Processed Vegetable Oils. From time to time, in ensuing numbers, will be presented similar flow diagrams covering the production of other foods.

How to describe a series of unit operations involved in food production is something of a problem. One way is to connect a series of small rectangles on the page with short lines, and label each rectangle by the name of the unit operation which would be proper to utilize at that stage of production. Thus, the production of Baking Powder would be described by a mere succession of words in tiny frames: Raw Material — Storing — Sifting — Mixing — Laboratory Testing — Packaging.

Or, it could be described by a pictorial representation of the actual equipment employed to perform the several operations. And, if each item were to be drawn to the same scale of dimensions, then one would gain a much clearer insight into the methods used.

The pictorial method is far more interesting and informing than the method of employing a series of symbols—or the bare name of the operation surrounded by a rectangle. If a centrifuge is used, why not show a true picture of a centrifuge instead of a dingbat or the word "centrifuge"? If the operation is grinding and, if the type of grinder best adapted to the particular raw material and desired particle size turns out to be a hammer mill, is it not more useful to show a real hammer mill than merely to say that a hammer mill is used at this point?

Readers' views on this subject are earnestly invited. What should be done to make the diagrams most useful?

In a few of the cases which follow it has been possible to obtain an engineering breakdown of the amounts of raw materials and services required for the production of a definite amount of a stated food product. Information such as the amount of process steam, fuel, power, water, man-hours of labor required is very useful for the sake of comparisons.

With the aid of these, and subsequent flow diagrams, presenting the essential engineering data, you can profitably study your own plant from the food engineering viewpoint to ascertain if your business or your branch of the industry is as efficient as the others.

To Wilson and Company and its subsidiary, U-Cop-Co, otherwise known as United Chemical and Organic Products Co., we are greatly indebted for their generous sharing of their engineering knowledge pertaining to gelatine manufacture. And to the other firms and consulting engineers who have aided in the preparation of the other flow diagrams grateful acknowledgment is given, together with our regrets that they deem it advisable to remain anonymous.

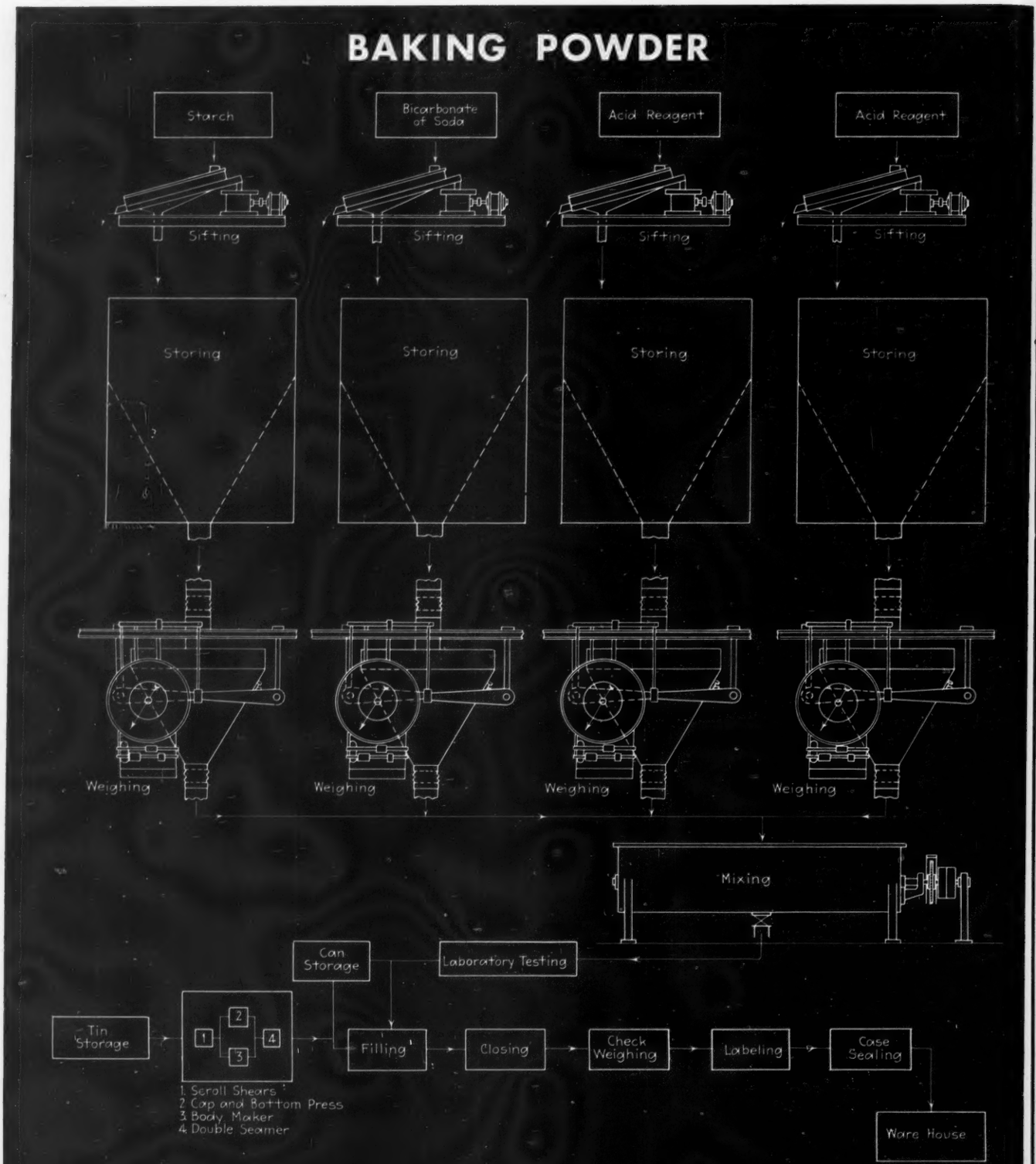
A limited number of additional copies of these diagrams is available for free distribution as long as the supply lasts. They are available for the benefit of those who wish to file the diagrams without cutting up their copies of FOOD INDUSTRIES.—THE EDITORS.

To Our Readers

1. What other foods do you want diagrammed in this way?

2. What improvements do you suggest to make these flow diagrams better?

Please write your ideas to the editors.



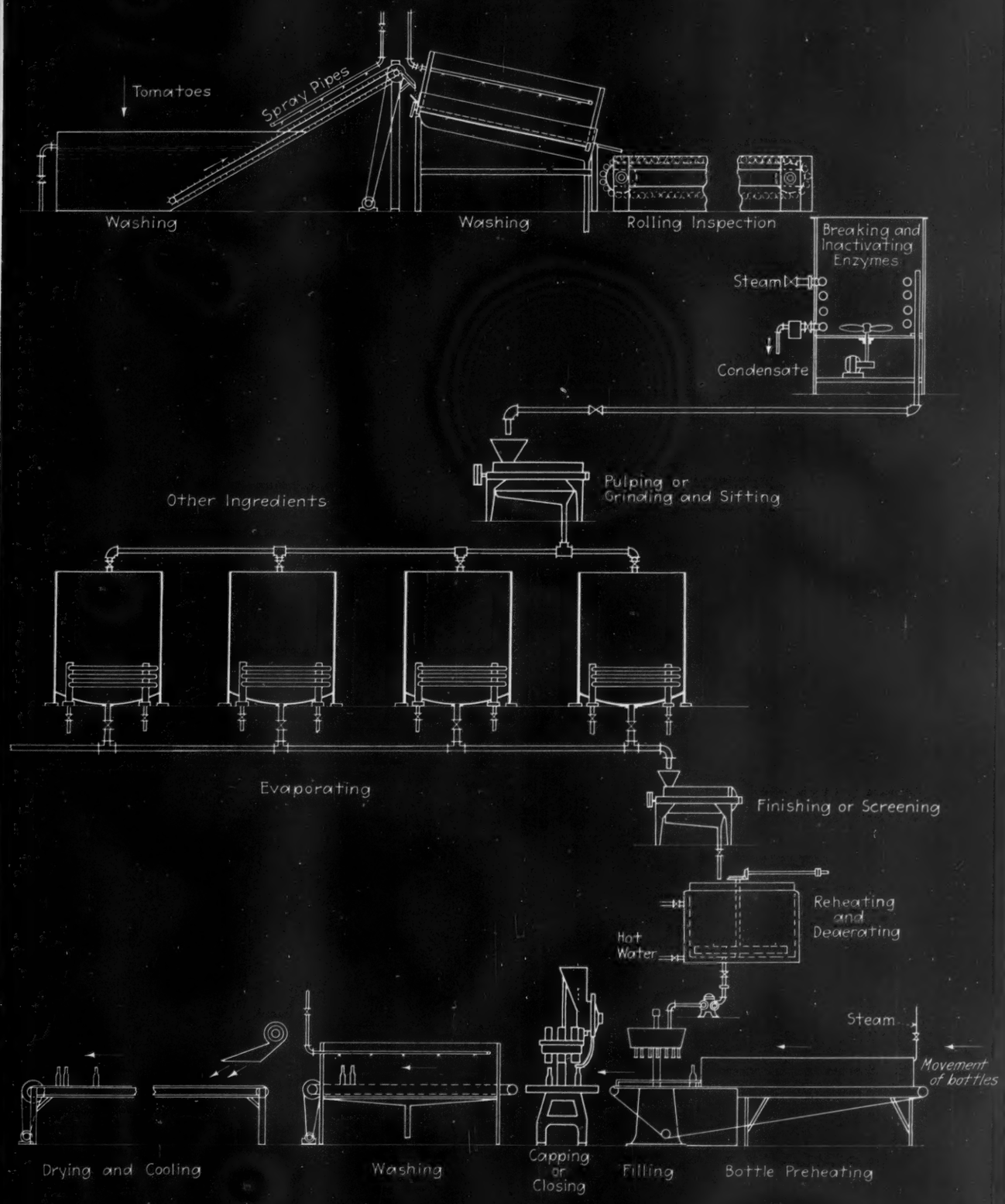
BAKING POWDER

On the strictly engineering side, the production of baking powder involves essentially: material handling, sifting, mixing, and packaging.

Quality control begins with the proper sizing of the powdered ingredients and ends with actual baking and laboratory tests of every batch. Moisture proof packaging is absolutely indispensible.

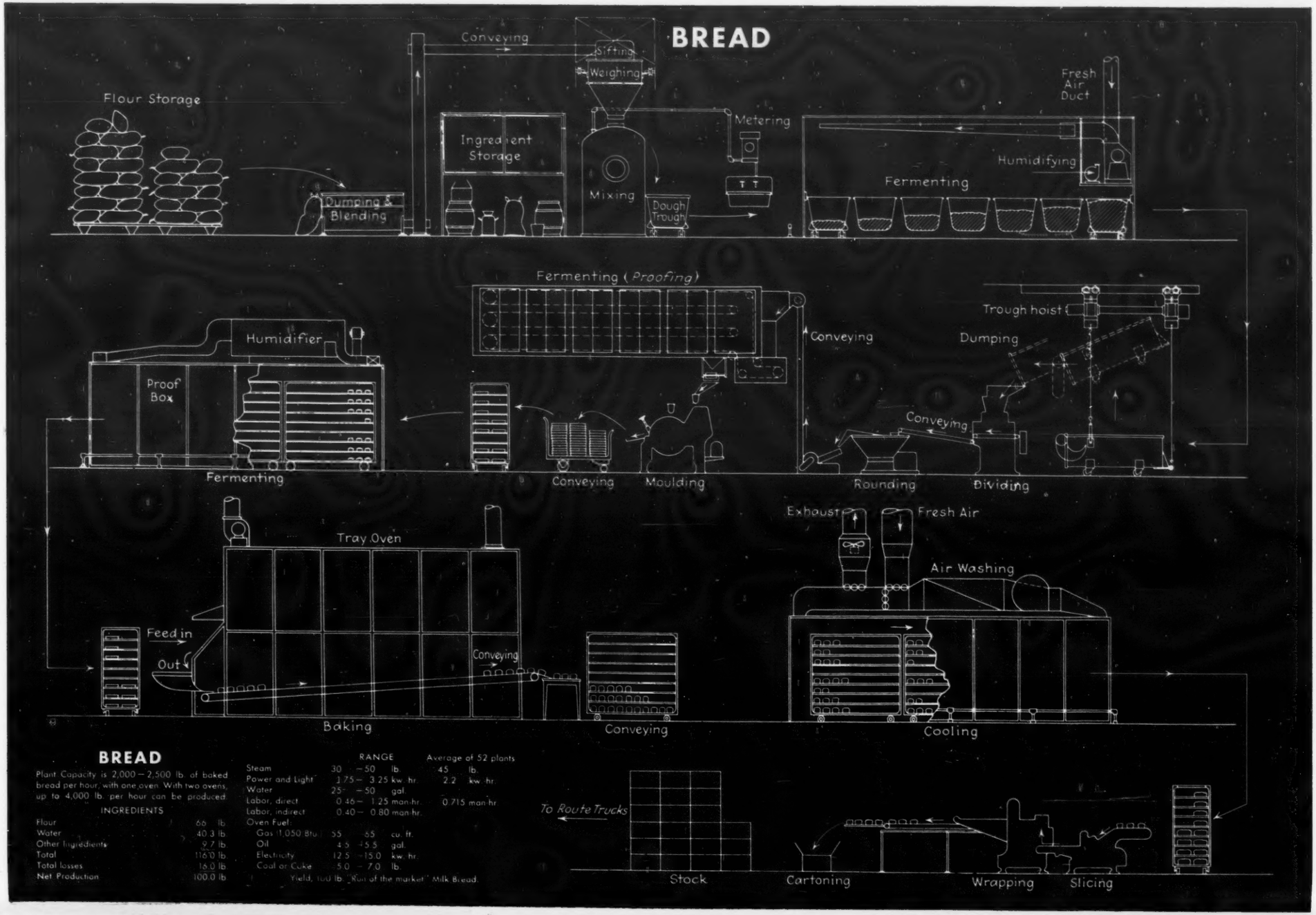
See also "Queer Things that Happen in Mixing", F.I. 5, 390, 1933.

CATCHUP



Production of Tomato Catchup involves essentially very careful raw material inspection and preparation and sanitary control, plus heating, grinding, separating, evaporation, packaging and material handling.

This flow diagram is designed to take advantage of the very recent discovery of the pectin destroying enzyme in tomatoes. Hence, the "hot-break" system. (See item on Kertesz, F.I. 9, 605, 1937).



BREAD

Plant Capacity is 2,000 – 2,500 lb. of baked bread per hour, with one oven. With two ovens, up to 4,000 lb. per hour can be produced.

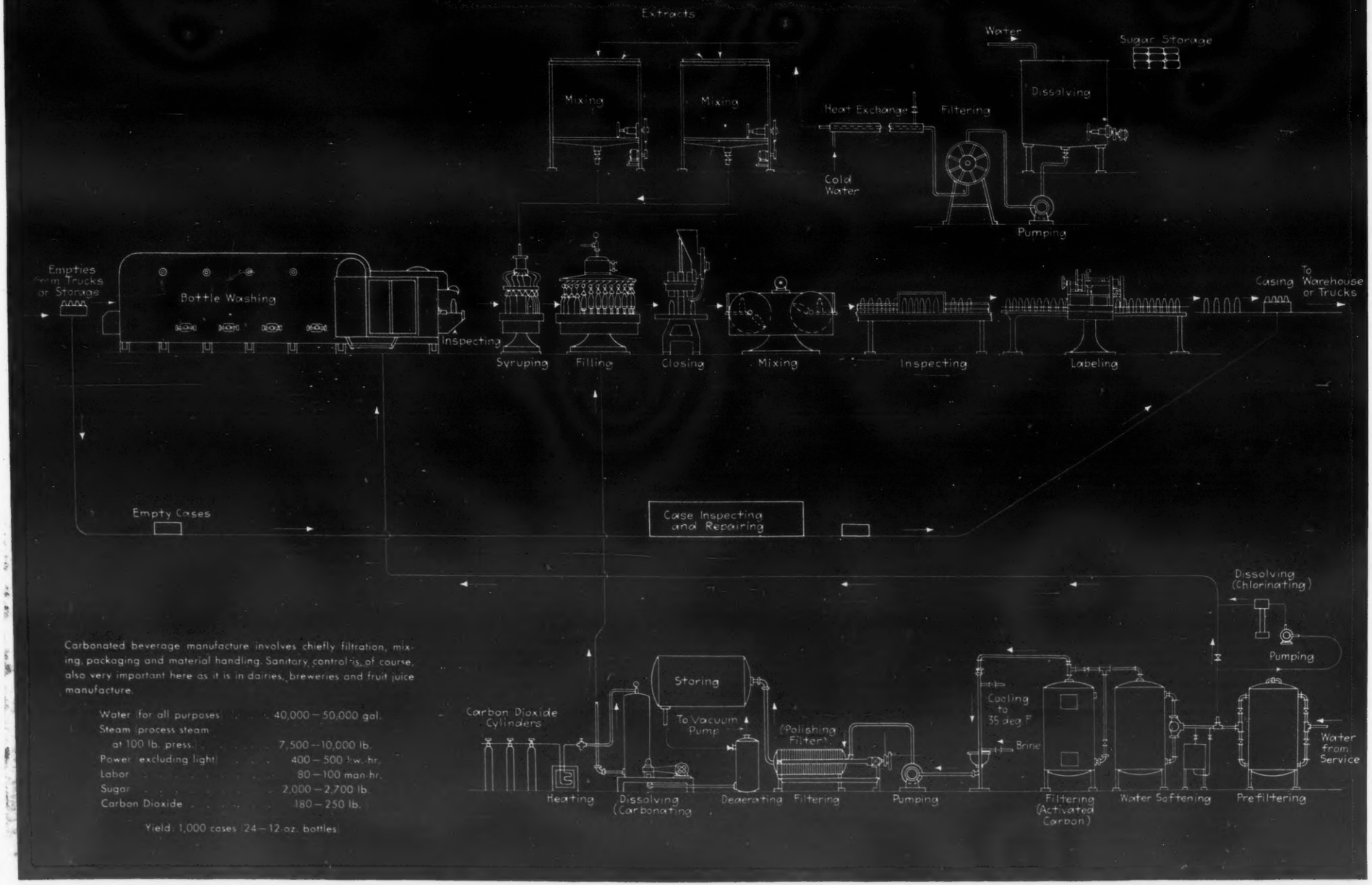
INGREDIENTS

Flour	66 lb
Water	40.3 lb
Other Ingredients	9.7 lb
Total	116.0 lb
Total losses	16.0 lb
Net Production	100.0 lb

	RANGE	Average of 52 plants
Steam	30 – 50 lb.	45 lb.
Power and Light	3.75 – 3.25 kw. hr.	2.2 kw. hr.
Water	25 – 50 gal.	
Labor, direct	0.46 – 1.25 man-hr.	0.715 man-hr.
Labor, indirect	0.40 – 0.80 man-hr.	
Oven Fuel:		
Gas (1,050 Btu.)	55 – 65 cu. ft.	
Oil	4.5 – 5.5 gal.	
Electricity	12.5 – 15.0 kw. hr.	
Coal or Coke	5.0 – 7.0 lb.	

Yield, 100 lb. "Run of the market" Milk Bread.

CARBONATED BEVERAGES

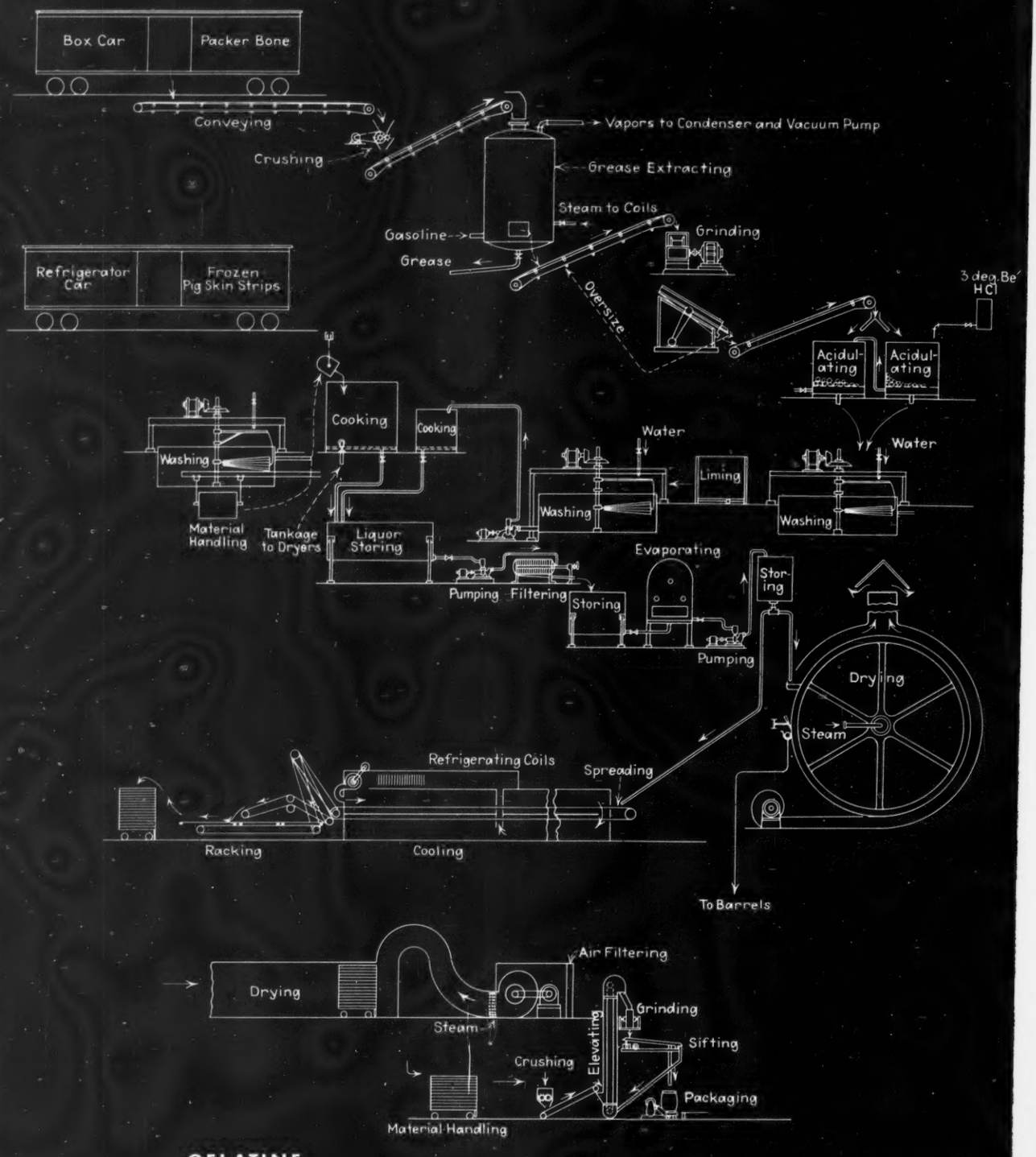


Carbonated beverage manufacture involves chiefly filtration, mixing, packaging and material handling. Sanitary control is, of course, also very important here as it is in dairies, breweries and fruit juice manufacture.

Water for all purposes	40,000—50,000 gal.
Steam (process steam at 100 lb. press.)	7,500—10,000 lb.
Power (excluding light)	400—500 k.w. hr.
Labor	80—100 man-hr.
Sugar	2,000—2,700 lb.
Carbon Dioxide	180—250 lb.

Yield: 1,000 cases (24—12-oz. bottles)

GELATINE



GELATINE

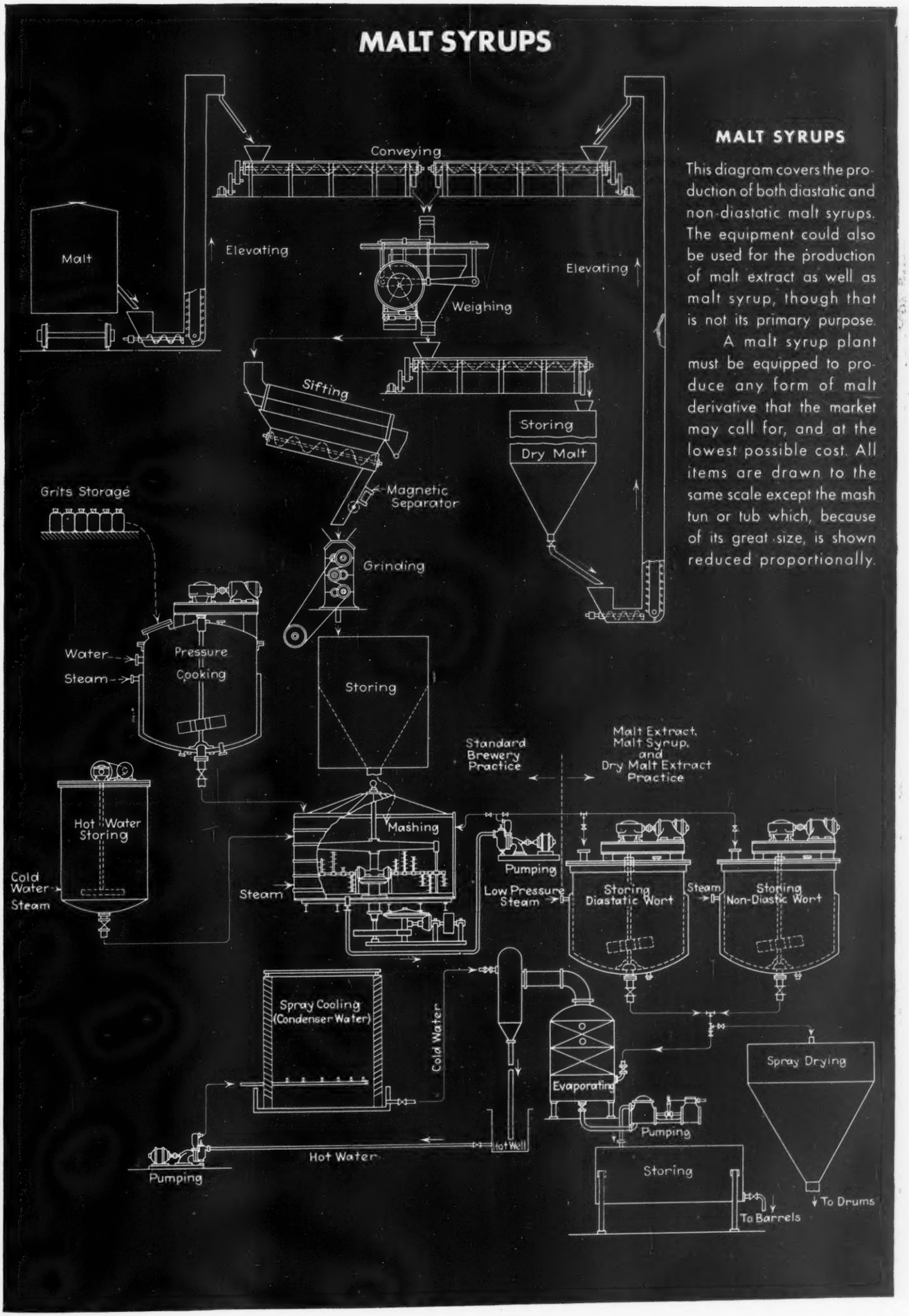
U-Cop-Co Process

Bones and Frozen Pig Skins	450—1,100 lb.
Water	660—1,000 gal.
Light, process steam and power, expressed as coal	1,400—2,240 lb.
Labor (Direct, 7.5—11.00) (Indirect, 3.5)	11—14.5 man-hr.

Yield: 100 lb. U-Cop-Co. Gelatine

Because of the great size of the drying wheel (20 ft. diameter) and other large equipment following it, every item beginning with the wheel is shown in half its relative size.

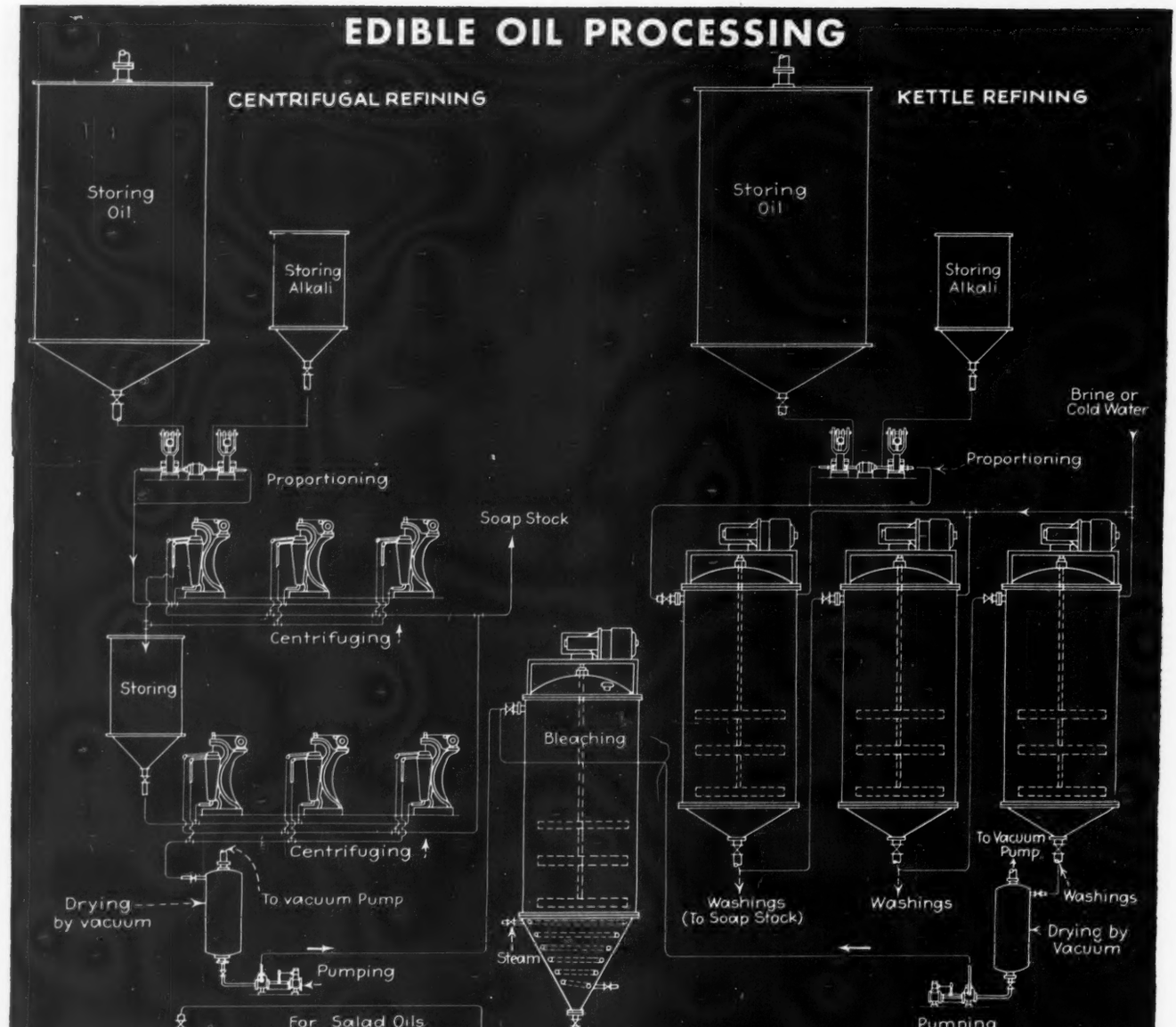
See also Food Industries 2, ,258, 1930 for another process.



MALT SYRUPS

This diagram covers the production of both diastatic and non-diastatic malt syrups. The equipment could also be used for the production of malt extract as well as malt syrup, though that is not its primary purpose.

A malt syrup plant must be equipped to produce any form of malt derivative that the market may call for, and at the lowest possible cost. All items are drawn to the same scale except the mash tun or tub which, because of its great size, is shown reduced proportionally.



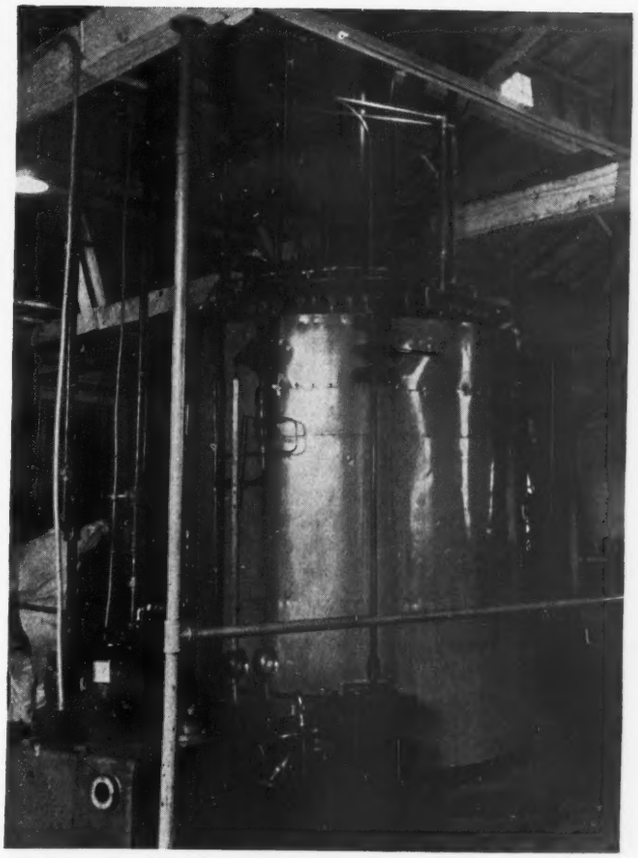
EDIBLE OIL PROCESSING

In addition to the production of salad oils and hydrogenated oils, two methods of refining are illustrated here: (a) Centrifugal Refining and (b) Kettle Refining. Usually oil plants are equipped to handle both methods, though the first is considered the more satisfactory today.

Refining consists of mixing and separating, followed by drying by evaporating in a vacuum. Other processes commonly found in vegetable oil plants are indicated.

NEW Method of QUICK FREEZING

By R. BROOKS TAYLOR
Engineering Experiment Station,
University of Tennessee,
Knoxville, Tenn.



Freezing machine, showing oil-pumping and indexing mechanism

TWO PRINCIPLES seem to be accepted by most of those who have conducted extensive research in the preservation of foods by freezing. These are: (*a*) The quicker a product is frozen, the better the quality. (*b*) Extremely low temperatures affect the quality of the product adversely. The two principles assume other variables to be equal.

In order to understand the process more fully, it is well to consider what happens to fruits and vegetables when they freeze. A discussion of the theory of freezing may bring out further salient points which will explain the manner in which this new process might be considered an improvement over existing processes.

One of the most popular frozen commodities is strawberries. A fresh, fully ripe strawberry has a certain size and shape, and has a texture which is largely dependent upon the protoplasm of the cell. Each individual cell contains a nucleus somewhere near the center of the cell which is surrounded by protoplasm that completely fills the cell. With the fruit in its fresh state, the protoplasm supports the cell wall more or less uniformly, as shown in Fig. 1.

An individual cell may be somewhat likened to an apricot, except for its shape. The seed of the apricot corresponds in position to the nucleus of a cell, the skin corresponds to the cell wall, and the meat of the fruit may be likened to the contents of the individual cell. Suppose we could substitute a fluid like water for the meat of an apricot, leaving the skin whole and the seed in its normal position. The apricot would then be soft and flabby, since the fluid would not offer a firm support for the skin tissue. The support of the skin is dependent upon the relatively solid nature of the meat of the fruit.

When strawberries to be frozen are subjected to freezing temperatures below 32 deg. F., changes occur within the cells, the nature of which apparently bears some relation to the rate with which the heat is removed from the fruit. Even though a strawberry contains about 88 per cent water, the latter is not present as pure water, but is either in chemical combination or contains sugars and salts in solution. It is for this reason that there is no fixed freezing *point* for any given fruit.

Slow Freezing

If one gradually cools a solution below 32 deg. F., a temperature is reached at which crystals appear, but they are crystals of pure ice, and the liquid which remains becomes a more concentrated solution. As the temperature is further depressed, more crystals of pure ice will form until the solution will freeze as a whole, which point is known as the cryohydric point.

Changes continue to occur, below this temperature, however, as water separates from the protoplasm of the cell. And this phenomenon continues to temperatures probably below –100 deg. F.

If the rate of freezing is slow, the protoplasm of the cell contracts around and toward the cell nucleus and releases fluids which freeze outside the mass and adjacent to the cell walls. The amount of fluid thus released and frozen is largely dependent upon the temperature to which the product is lowered. When temperature is reduced to values below 32 deg. F., any fresh water that may adhere to the strawberry is frozen. As the temperature is further lowered, solutions begin to freeze, and the protoplasm releases fluids which freeze in the vicinity of the cell walls. As the temperature is still further depressed, more fluids are released toward the nucleus of the cell, as shown in Fig. 2.

The temperatures may be further de-

pressed to values below 0 deg. F., and the protoplasm will continue to contract. So far as we know, the limits to which this may proceed have not been determined. Researches by Woodruff of the Georgia Agricultural Experiment Station, and others, have indicated that these changes continue to at least –100 deg. F., at, however, a continuously decreasing rate.

A solution of salt water may be frozen solid and subsequently thawed, yet the resulting solution will be substantially identical with the solution before it was frozen. However, when the protoplasm of a cell is frozen, the changes which occur are not appreciably reversible. If freezing takes place at a slow rate, the protoplasm is permitted to contract around the nucleus and release fluids which are frozen adjacent to the cell wall.

When a slowly frozen product is defrosted, the moisture in the outer regions of the cell becomes a fluid which is not reabsorbed by the remaining protoplasm, and thus the firm support for the cell wall is no longer provided. The resulting strawberry tends to resemble a globule of mercury rather than to retain the original shape and condition of the fresh fruit. The degree to which the temperature may be depressed will affect more or less proportionately the extent of this breakdown of support for the cell wall, and thus the defrosted product becomes more and more flabby in proportion to the reduction in temperature.

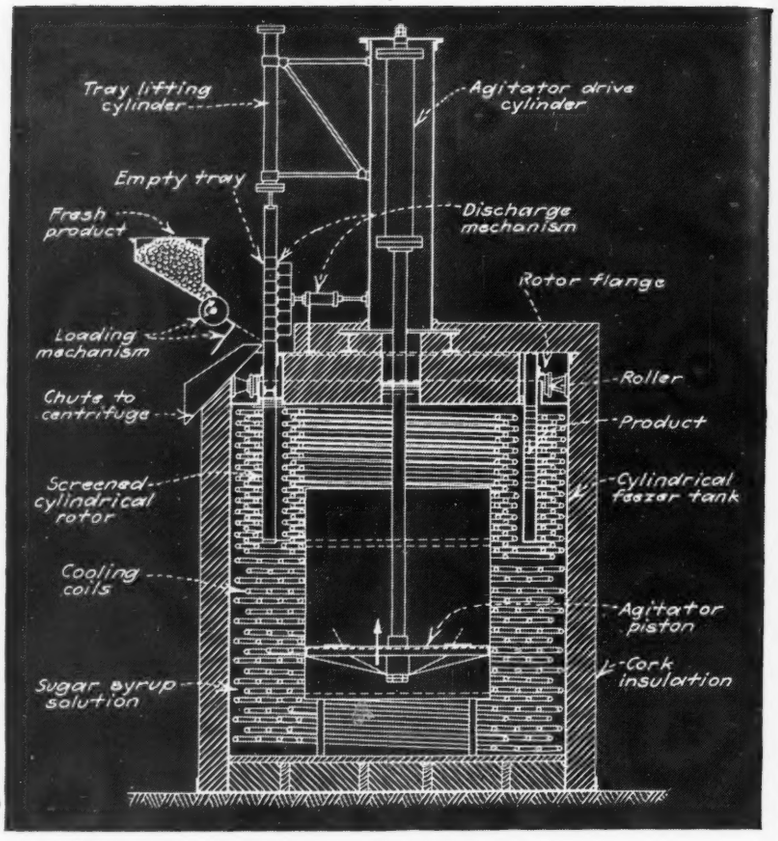


Fig. 4—Diagram of the freezing machine.

Rapid Freezing

If, on the other hand, the rate of freezing is rapid, the moisture in the protoplasm of the cell to a large extent does not diffuse toward the outside cell walls, but becomes frozen in small particles throughout the body of the protoplasm. Thus the total over-all volume of protoplasm left in the cell after very quick freezing will be much greater than that left after slow freezing. Upon defrosting, the protoplasm will provide much more firm support for the cell walls and will tend to keep the strawberries more nearly in their fresh condition, as shown in Fig. 3.

If the temperature at which this occurs can be maintained at levels of zero or above, the extent of the dehydration is reduced to a minimum, and the protoplasm approximates more closely its fresh condition.

It therefore appears that in order to preserve fruits and other products in a fresh condition by freezing, it is desirable to operate with temperatures at or above zero, and yet it is necessary to acquire a high speed of freezing. The reason for selecting zero as the low limit lies in the fact that frozen fruits stored in commercial warehouses at zero are preserved better than at higher temperatures, and further, that lower temperatures are not necessary for the satisfactory preservation of the fruit.

Thus having established the temperature of 0. deg. F. as the desirable point at which frozen fruits may be stored, high speed in freezing can be accomplished only by rapid heat transfer. This in turn may be accomplished by freezing the smallest possible unit with the *minimum amount of insulation* around it. The latter conditions are most perfectly met by freezing the individual fruit itself or individual slices or sections of the fruit.

In order to effect rapid heat transfer, some efficient medium must be provided. One of the most satisfactory media would be a circulating-brine solution in which the individual food particle might be immersed. But, since such a solution is objectionable when used directly on fruit, it becomes necessary to select a solution which will be accepted as edible and wholesome.

After much experimental work, a satisfactory sugar solution has been found. When an individual strawberry of average size is immersed in this circulating sugar solution at a temperature of 3 to 5 deg. F., the strawberry is frozen in six minutes.

Container for the finished product.

Why freeze at extreme subzero temperatures and subsequently store the resulting product at zero if the application of such low temperatures causes undue contraction of the protoplasm of the cell, with a consequent reduction in quality? It may be argued by the proponents of the use of subzero temperatures that, while the refrigerant in the freezing machines is held at these temperatures, the products to be frozen in the containers do not reach these temperatures. However, it is readily understood that in order for the heat to be transferred from the center of the packages through the somewhat insu-

lating coverings, a substantial portion of the package will reach temperatures far below zero before the center of the package reaches zero. A temperature gradient is inevitable.

It was therefore decided to freeze average-size strawberries on a regular production basis in a sugar solution at a temperature of 3 to 5 deg. F. above zero in a period of time of six minutes. Results obtained from freezing over 100,000 lb. of fruit under these conditions indicate the value of this procedure.

Many freezing processes contemplate the use of sugar in the finished product. Sugar can be bought for about 5 cents per pound under normal circumstances, and it is not a perishable commodity. If berries are packed with 20 to 33 per cent of sugar, by weight, it then becomes necessary to pay storage on that portion of the product at a relatively high rate, and it is further necessary to ship that additional tonnage to the consuming centers as a perishable commodity. Whereas, if strawberries or other food products are frozen individually, they may be packed in containers of any size or shape and shipped as the food product itself.

Research has covered the packing of individually frozen strawberries and other fruits and vegetables in air, carbon dioxide and inert gases. There is some improvement when packed in carbon dioxide gas under certain conditions, but such an improvement is hardly sufficient to warrant the commerical application of this principle.

Individually frozen strawberries and other fruits after several months storage frequently exhibit a covering of frost which sometimes obtains considerable proportions. There are many who do not understand this phenomenon, and questions concerning it have been asked repeatedly. This frozen deposit is apparently a result of dehydration due to uneven temperatures in the storage warehouse.

In a moisture-sealed container, individually frozen products will have a tendency to dehydrate if the temperature in the freezing storage warehouse fluctuates over any considerable range. If the temperature of the warehouse remains constant at 0 deg. F., or at whatever level may be required, dehydration will not be likely to occur. But if the temperature is allowed to fluctuate over several degrees, dehydration will take place. The air surrounding the product in the container will become saturated with moisture at any given temperature. Equilibrium having been established, dehydration will not occur if the temperature is maintained constant.

However, if the temperature is allowed to rise appreciably, the relative humidity of the gases surrounding the product is lowered, and equilibrium can be established only at the expense of the moisture in the food product, which causes dehydration. The temperature may go down 10 deg., and equilibrium must be reestablished by the deposition of moisture on the food products in the form of frost crystals. The temperature may then rise again, and the moisture required to establish equilibrium is again drawn, partly from the crystals and partly from the food product itself, thus further dehydrating the product. Upon reduction in temperature to the original point, more crystals are formed on the outside of the product. This action will continue until a considerable amount of frost crystals will appear on the product, all of which were produced by the dehydrating effect of the gases around the frozen product. This, of course, is true largely in individually frozen products rather than those solid-packed in syrup or sugar where the gases cannot reach the food products.

Freezing the fruit in the solution of carbohydrates, and subsequent removal of the excess syrup by mechanical means, leaves a thin film of syrup with a relatively high viscosity which completely encases each individual food particle. This film reduces greatly the effect of oxidation, as well as the effects of dehydration. Even slices of peaches may be defrosted completely without noticeable "browning" or oxidation and can be served in the same manner as fresh peaches, with cream and sugar.

A high speed of freezing at temperatures slightly above 0 deg. F. may be accomplished in a syrup solution largely because the rate of freezing is greater than the rate of osmosis. If the fruit is immersed in a solution with a temperature of 15 deg. F. or higher, freezing may not occur after many hours. The reason is that, due to osmosis, the freezing zone is reduced to a point below the temperature of the syrup in which the product is immersed, and, since the solution itself is not frozen at that temperature, it follows that the fruit also will not freeze.

If, however, the fruit is immersed in a properly circulated solution at a temperature below 10 deg. F., the freezing rate is sufficiently rapid to freeze the outside of the fruit almost immediately, thus tending to block off the effect of osmosis. Then freezing will proceed rapidly since the freezing zone has not been depressed.

If the strawberries are allowed to remain in the solution, even though the solution be held at zero, the concentration of the sugars will cause the defrosting of the fruit, and subsequent osmosis will occur, thus diluting the solution surrounding the fruit, raising its cryohydric point and lowering the temperature at which the fruit itself will be frozen solid. Hence, at zero, a solidly frozen mixture of solution and fruit will result. It therefore becomes

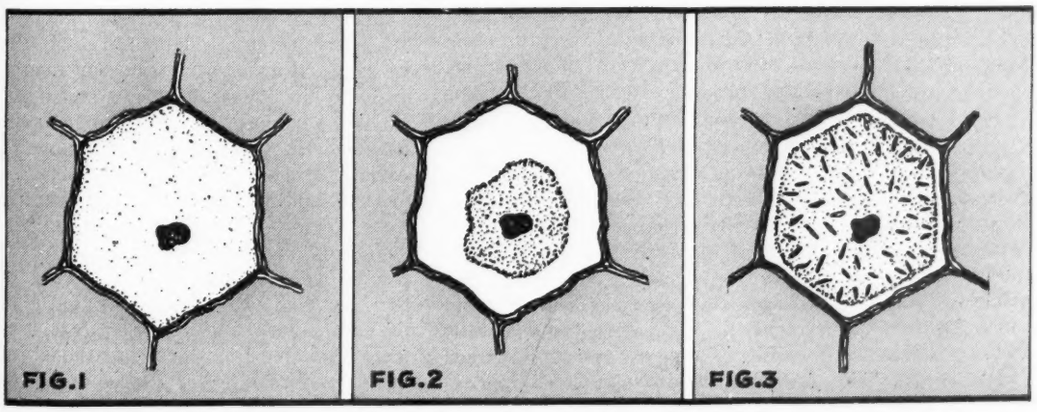


Diagram of the cell structure of the unfrozen strawberry.

Diagram of a strawberry cell showing effect of slow freezing

Diagram of strawberry cell showing effect of rapid freezing.

necessary to remove the freezing medium from the surface of the fruit immediately after freezing occurs. And, if this is satisfactorily accomplished, the resulting product will be a stable fruit most nearly approaching the characteristics of the fresh commodity, and one which will maintain these characteristics over many months if held at 0 deg. F.

With a comparatively efficient medium for heat transfer, with the employment of relatively high temperatures and with the use of simple equipment, economies are apparent.

In order to accomplish the commercial freezing of strawberries and other commodities according to the principles outlined above, the University of Tennessee Engineering Experiment Station constructed a freezer having a capacity of about 500 lb. of fruit per hour.

SINCE DETERIORATION begins immediately after harvest, every effort is made to have the freezing machinery as near as possible to the producing areas so that the minimum time will be lost between harvesting and freezing. The fruit is allowed to completely ripen on the vines, thus permitting it to be frozen in prime condition. The preparation of the fruit for freezing consists of sorting, capping and inspection in the case of strawberries, and similar operations with other fruit, as may be required for other processes. It is not necessary to wash the fruit, with this freezing process, as the washing is accomplished by circulation of the solution in the tank, which has proven very successful for this purpose. This may be accomplished since the solution is continuously filtered and purified automatically. After the fruit is prepared to such a point that it is ready to serve or be consumed, it is then fed into the freezing machine from which it emerges solidly frozen in six minutes.

The freezing machine is essentially an insulated cylindrical tank containing coils of tubing through which the refrigerant, Freon, is passed. Two compressors are used and so regulated that number one operates at temperatures above 3 deg. F. and the other at temperatures above 5 deg. F. Six trays are provided, these being operated vertically by means of a hydraulic cylinder which raises and lowers them between the feeding and operating positions. The fruit is fed into the trays at one position on the machine, and then lowered into the tank in a position between two concentric sections of a screened cylindrical rotor.

The tank is filled with the sugar solution, which is automatically maintained at the proper temperature and concentration and is circulated by means of an agitator operated by a hydraulic cylinder. This agitator is a piston-like contrivance operating inside of a cylinder which is open at top and bottom. It somewhat resembles the dasher of an old-fashioned churn. By means of this mechanism, the solution is forced through the coils and through the trays containing the strawberries, removing the heat by intimate contact with each individual particle of fruit and passing the heat to the coils. After a period of 80 seconds, the rotor containing the six trays is automatically rotated through an angle of 60 deg., thus bringing a new tray into position. This tray is lifted by the tray-lifting cylinder, and its contents are discharged by the mechanism shown in Fig. 4. This mechanism consists of a plunger which fits inside the tray and, when thrust through the tray, pushes out the charge of solidly frozen fruit. The strawberries fall into a specially designed centrifugal which is automatically timed to synchronize with the operations of the freezing machine. The empty tray is then reloaded and returned with more fruit to its position in the rotor, and the operations are continued in like manner for the other trays as the rotor advances every 80 seconds.

The centrifugal removes the syrup, the latter being returned to the freezer by means of a small pump, and the practically dry frozen berries are discharged into the container in which the product is to be marketed.

Since this freezing machine may be operated in a location considerably removed from existing freezing-storage facilities, and since the fruit being individually frozen may be defrosted very rapidly, it is necessary that the containers of frozen strawberries be placed immediately in freezing storage. This storage could be supplied by means of a small freezing storage room, which should be maintained at 0 deg. F. But it has been accomplished very satisfactorily by using refrigerated trucks, which at the same time constitute the means of transportation of the fruit from the freezing machine to the commercial freezing-storage plant.

IN THIS EXPERIMENTAL WORK, two trucks were used, each of which has a net capacity of approximately 8,000 lb. They are equipped with bodies insulated with six inches of cork on the floor, and two inches of cork and four inches of "Dry Zero" on the walls and ceiling. Refrigeration is obtained by means of "hold-over" plates approximately 2 in. thick, 24 in. wide, and 54 inches long, five in number. These plates contain a brine solution, and are kept frozen by means of Freon coils inside the plates. A compressor is located on the lower left side of the truck body, and it is driven by a combination 110-volt d.c. and 110-220-volt a.c. motor. A control panel is provided by means of which the motor may be switched from a.c. to d.c. current. While the truck is standing in the plant, it may be operated from a socket on 110-volt or 220-volt a.c. current, which keeps the temperature inside the truck body at zero.

When the truck has been filled, it may be driven to the freezing-storage plant, and if the distance does not exceed 50 miles it is not necessary to provide additional refrigeration. If, however, the distance is greater, or the weather unusually hot, the compressor may be operated on 110-volt d.c. power which it receives from a generator attached to the truck motor by means of a power take-off. A thermometer is provided in the cab of the truck so that the operator can observe the temperature inside the body at all times.

These trucks have operated very satisfactorily, and the same principle may be applied to semi-trailers or full trailers.

After the freezing operations are over, the trucks may be used to deliver the products to the buyers from the storage warehouse, and experiments have shown that deliveries from Chattanooga to New York City, with outside temperatures of 95 deg. F. "in the shade," can be made with a total rise in temperature not exceeding 1 deg. F. Moreover, these trucks may be parked over night with not more than 1 deg. F. rise in temperature, without operating the compressor.

The State of Tennessee is a large producer of strawberries, second only to Louisiana. Several years ago the University of Tennessee Agricultural Experiment Station, realizing the importance of this industry, began to develop new varieties of strawberries and planted over 30,000 seedlings. There followed an experiment in 1934 to determine the adaptability of the varieties already being grown in the State to the known freezing processes. These varieties are primarily the Blakemore, Klondike, Missionary, Aroma, Premier, Dorsett and McClintock. Small quantities of strawberries were frozen by well known and established freezing processes, and the results were studied over a period of two or three years. It was found that the Blakemore and Klondike varieties were suitable to these methods of preservation.

In this work, the University received considerable assistance from the Tennessee Valley Authority.

GAS STORAGE of Meat and Eggs

By T. MORAN *
Low Temperature Research Station, Cambridge, England

GAS STORAGE is not a new method of storage. It is simply a more elaborate form of cold storage involving, in addition to control of temperature and relative humidity, control of the composition of the gaseous atmosphere of the store. The use of this third factor of control makes storage more flexible. With many foodstuffs, it will also prevent changes during storage which control of temperature and humidity alone could not do.

In the gas storage of animal products such as meat and eggs, the aim is not only to control the metabolism and growth of living organisms (in this case invading bacteria and fungi, the foodstuff itself being "dead") but to maintain as far as possible the initial condition of the foodstuff, notably its structure, appearance or color and its taste. The success of gas storage in commercial practice depends upon how far these conditions can be satisfied.

Chilled beef deteriorates because of the changes that take place near the surface of the meat, including the formation of slime and mold, development of rancidity in the fat and loss of color or bloom. Given healthy rested animals, properly cooled after slaughter, the changes that take place in the body of the meat are insignificant compared with these changes at the surface. If, however, changes at the surface can be arrested, autolytic changes remote from the surface will ultimately set a limit to the storage life of meat.

The bulk of the chilled beef imported into Great Britain comes from the River Plate, has an ocean journey of 18 to 25 days, and when sold in the shops is on the average 30 to 33 days from slaughter. Forty days from slaughter is about the limit that such meat can be kept in good condition unless the temperature of transport is lowered below the normal 28.5 to 29.5 deg. F.

Carbon dioxide in any concentration retards the growth of the meat-attacking fungi, but in the region of 0 deg C. about 40 per cent is required to suppress growth completely.[1, 2] Likewise, carbon dioxide slows down the growth of the bacteria responsible for slime on chilled beef, chiefly strains of *Achromobacter* and *Pseudomonas*.[3] Rancidity in the fat of chilled beef is due chiefly to the breakdown of the connective tissue framework by micro-organisms. At 0 deg. C. about 15 per cent of carbon dioxide will suppress completely the appearance of this form of rancidity over a period of 50 days at least.[4]

From the standpoint of preventing mold and slime on chilled beef, a concentration of carbon dioxide of 40 per cent or higher is the ideal. With such concentrations, however, there is a marked increase in the rate of formation of methaemoglobin in both muscle and fat, so that the exposed muscle appears brownish and the fat bleached; in other words, the bloom is destroyed. However, with low concentrations (20 per cent or less), the loss of bloom due to the specific action of the carbon dioxide over a storage period of the order of 50 days is negligible.[5]

This, in brief, is the scientific analysis of the gas storage of chilled beef. It is, in effect, a compromise between the action of the gas in suppressing mold and slime and in its effect on bloom. Clearly, the factor controlling the storage life of the meat is the weight of infection on the surface after slaughter and dressing. The smaller this is the longer the meat can be stored in a given concentration of carbon dioxide. In the ordinary way, however, beef stored at chilling temperatures in air containing 10 per cent of carbon dioxide will remain free from mold and slime for at least 60 to 70 days; this fact has been established both in the laboratory[6] and in commercial practice. The gas storage method for beef has enabled Australia and New Zealand to export chilled beef to Great Britain. This trade is now well established.

On the average, Australian beef when it is sold in England is 50 to 60 days from slaughter (that from New Zealand is not so old). The bloom of this meat tends to be inferior to that of the meat from South America. This loss of bloom is most marked in the fat, particularly if the quarter is not well covered. Where the layer of fat is thin, it is often bleached, the bleaching being due not only to the formation of methaemoglobin but also to actual oxidation. This latter, we believe, is due to the catalytic action of an oxidase diffusing from the adjoining muscle.[7] Theoretically, the bloom should be improved if the surface of the meat could be dried more than at present. This postulates a lower relative humidity in the storage chamber, and this problem, including the purely engineering one of controlling the humidity in a space filled to capacity with chilled beef, is under investigation at the present time. It is clear also that loss of bloom will be less the better the covering of fat on the quarter.

The storage life of chilled pork, mutton and lamb can be extended with the aid of low concentrations of carbon dioxide. Bacon, however, is in a different category, the problem in this case being not only to prevent mold and slime but also oxidation of the fat. The fat of bacon oxidizes rapidly and even at -10 deg. C. shows marked oxidative rancidity in a couple of months[8]; at this temperature, incidentally, the oxidation of beef, mutton and lamb is negligible at the end of eighteen months. For this reason, pure carbon dioxide is the ideal gaseous environment for the storage of bacon**, and under such condi-

T. Moran, Low Temperature Research Station, Cambridge, England, addresses the Food Technology Conference on the gas storage of meat and eggs.

Table I—Imports of Chilled Beef Carried in Carbon Dioxide Into Great Britain.

Year	From New Zealand (cwt.)	From Australia (cwt.)
1934	33,222	55,140
1935	110,697	231,857
1936	228,263	295,786
1937*	176,989	171,062

* Half year ended June 30.

* Taken from an address before the Food Technology Conference, Massachusetts Institute of Technology, Cambridge, Mass., Sept. 14 to 17, 1937.

** *The formation of methaemoglobin in the exposed muscle of sides of bacon is not a factor of commercial importance.*

Table II—Gas Storage of Bacon at —10 Deg. C. (14 Deg. F.) Compared with Storage in Air.

Side	Type of bacon	Time of storage at —10 deg. C. (14 deg. F.) (Months)	Storage atmosphere	Measure of rancidity [Peroxide content of back fat (c.c. 0.002 N thiosulphate per g. of fat)]	Flavor of cooked back fat
AR	Dry-salted	4	Carbon dioxide	4.9	No sign of rancidity
AL	"	4	Air	14.7	Definitely rancid
BL	"	7	Carbon dioxide	3.2	No sign of rancidity
BR	"	7	Air	16.1	Definitely rancid
CL	"	12	Carbon dioxide	3.6	Very slightly rancid
CR	"	12	Air	32.2	Excessively rancid
DR	Tank-cured	4	Carbon dioxide	3.2	No sign of rancidity
DL	"	4	Air	29.2	Definitely rancid
ER	"	7	Carbon dioxide	6.5	No sign of rancidity
EL	"	7	Air	83.7	Excessively rancid
FL	"	12	Carbon dioxide	7.8	Very slightly rancid
FR	"	12	Air	75.2	Excessively rancid

tions the meat can be stored free from slime and oxidative rancidity for a long period. Thus, tank-cured bacon has been stored at 0 deg. C. for eighteen weeks and was then indistinguishable from fresh bacon.[9] Storage at lower temperatures gives even better results, the storage life being longer whilst the flavor and texture is better preserved. Table II gives the results of a semi-commercial experiment in which several sides which had been either tank-cured or dry-salted were frozen at -10 deg. C. and stored at the same temperature in an atmosphere containing on the average 97 per cent carbon dioxide, the remainder being air.[10]

A number of gas-stored sides which remained at the conclusion of the experiment were disposed of through the normal commercial channels; the surplus of the air-stored bacon was inedible.

From the practical standpoint, perhaps the main difficulty is that of obtaining an oxygen-free atmosphere. Table II, however, shows that storage up to twelve months is possible even in the presence of 0.6 per cent of oxygen, and with suitable precautions it seems likely that it would be possible to bring about still further reduction in this concentration.

How Eggs Behave

During the storage of eggs in air, at ordinary or chilling temperatures, several changes take place, the more outstanding being (1) evaporation of water, giving rise to a larger air space; (2) thinning of the thick white and shrinkage of the bag of thick white (enclosing the inner thin); (3) weakening of the yolk membrane; (4) a decrease in the viscosity of the yolk; (5) the appearance of "storage taste" in the yolk. The problem of microbial attack during storage is simplified by the fact that in most eggs, at laying, the yolks and whites are sterile[11]; on the other hand, the shell contains a heterogeneous flora, and if the air in the store is too moist, mold grows on the shell and ultimately penetrates into the white and yolk. The passage of bacteria through the shell is much more difficult, but the evidence is that it can occur and is facilitated if the egg has lost its protective coating of mucin, e.g., by drastic washing.

The evaporation of water from eggs has been studied by A. J. M. Smith.[12] The most striking fact is that the evaporation at constant humidity is independent of the speed of the air passing over the eggs; there is also, as with most foodstuffs, a gradual decrease in the rate as evaporation proceeds.

The thinning and shrinkage of the thick white and the weakening of the yolk membrane are linked up with the swelling and hydrolysis of the glucoprotein, mucin. Thinning is greater the more alkaline the pH, while the gross swelling of the bag of thick white behaves similarly with respect to pH. Our experiments have indicated that the quality of the white as a whole is best preserved if the pH is maintained at about 7.8, i.e., in air containing approximately 2½ per cent of carbon dioxide. At the same time, pH is not the only factor, and some shrinkage of the bag of thick white occurs whatever the conditions of storage. In this respect, the white at laying is an unstable system.[13]

The decrease in the viscosity of the yolk is due to the passage of water from the white. Carbon dioxide at a concentration as low as 2½ per cent retards this movement of water so that the quality of the yolks of eggs stored in carbon dioxide is superior to that of eggs stored in ordinary air.[14]

The origin of "storage taste" is still obscure. Eggs will absorb stray odors, but this is not the complete story. The first proof of this was obtained by Sharp and Stewart,[15] who found that the presence of carbon dioxide delays the appearance of "storage taste" in the yolk. This observation we have confirmed, and it is an additional argument for the use of the gas in the storage of eggs.

Normally, the relative humidity surrounding the egg should not exceed about 85 per cent. Otherwise, mold develops on the shell. Carbon dioxide in any concentration retards this growth and therefore permits a higher relative humidity, but at 0 deg. C. must not be less than 60 per cent in order to suppress mold growth completely in a saturated atmosphere.[1]

The gas storage of eggs is a particularly good example of where good and bad effects must be balanced. Our experiments so far have suggested two atmospheres as being of importance: (1) air containing 2½ per cent of carbon dioxide and the normal limit of relative humidity, e.g., about 85 per cent; (2) 60 to 100 per cent carbon dioxide and a saturated humidity. The first mixture gives a good quality yolk and a firm thick white with a shrinkage only slightly less than after storage in air. With the second mixture, there is no increase in the size of the air cell, the quality of the yolk is excellent, but the thick white is much shrunken so that the white as a whole is very watery.

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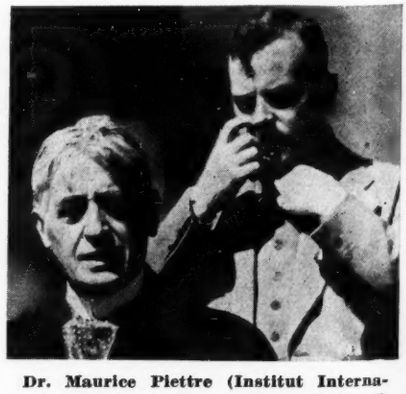

Dr. Maurice Piettre (Institut International du Frold, Paris) and Dr. R. Plank (Kältetechnisches Institut, Technische Hochschule, Karlsruhe), two of Europe's foremost refrigeration experts, leave the Food Technology Conference on a windy day.

The COLOR *of Meat*

By J. BROOKS *

Low Temperature Research Station, Cambridge, England

IT IS UNFORTUNATE that the color of meat should be due to the presence of such a complex and relatively unstable compound as haemoglobin. The fixation of color during curing is the traditional method of overcoming this difficulty. But the undesirable properties of haemoglobin from the point of view of preserving color are counterbalanced to a large extent by another factor, the muscular tissue's uptake of oxygen.

Muscle, after rigor, retains indefinitely a residue of its respiratory activity. When exposed to air, therefore, a steady state is reached where the depth (d) to which oxygen penetrates is determined by the relative rates of its diffusion and uptake. The relation is given by the equation

$$d = \sqrt{\frac{2c_0D}{A}},$$

where c_0 is the pressure of oxygen at the surface of the tissue, and D and A are, respectively, the coefficients of its diffusion through the tissue and its consumption. The value of A for the muscle of fresh beef and pork [1, 6] is roughly 10^{-4} c.c. per g. per min. at 0 deg. C., the uptake decreasing slowly with time. For bacon, A is smaller, of the order of 3×10^{-5}. The presence of relatively high concentrations of sodium chloride decreases the uptake of oxygen.

The corresponding values of d are roughly 0.2 cm. for beef and pork and 0.4 cm. for bacon at 0 deg. C. The depth to which oxygen penetrates decreases with increasing temperature. It also increases slowly with time, but rarely exceeds 1 cm., even after very long periods of storage.

In lean meat and bacon exposed to air, therefore, dissolved oxygen is present only in a superficial layer a few millimeters thick; below this layer the tissue is completely devoid of oxygen. Both haemoglobin and nitrosohaemoglobin (the pigment responsible for the color of bacon) change to the brown pigment, methaemoglobin, in the presence of oxygen, but both are stable in its absence. Discoloration is therefore confined to a thin superficial layer. The absence of oxygen in the bulk of the tissue also determines the path of the reaction between nitrite and haemoglobin, the basis of the fixation of color.

The color of lean meat is brownish when roughly 60 per cent of the haemoglobin present in the superficial layer has been oxidized to methaemoglobin.[1, 4] Haemoglobin is present in the fat of beef, but the rate of oxidation, except in local areas, is slower than in the lean.

Oxidation is very slow at low temperatures. At -10 deg. C., more than sixteen weeks is required for any visible discoloration to occur. The formation of methaemoglobin in frozen meat is much less important (unless the time of storage is unduly long) than loss of color due to excessive drying. Here, crystals of ice in the superficial layer evaporate, and the small bubbles of air left behind scatter the incident light. The same cause is responsible for the discoloration of frozen offal.

With quarters of chilled beef (shipped at -1.4 deg. C.) there is usually little or no discoloration due to the formation of methaemoglobin up to roughly 40 or 45 days from killing. Some discoloration, chiefly of local areas, is found with longer periods, the amount depending on the quality of the meat. In some cases a satisfactory color has been maintained for 60 days.

These times for chilled beef refer to commercial conditions of storage. The onset of discoloration is closely connected with the factors governing loss of water from the meat. At high relative humidities, for example, 99 per cent at 0 deg. C., exposed muscle is discolored by methaemoglobin in 20 to 30 days; on the other hand, excessive drying gives an unpleasantly dark appearance, due to optional changes in the tissue (no pockets of air are left behind). There is, therefore, a desirable loss of weight—a moderate increase in the depth of color due to drying masks the change in hue due to the change in the haemoglobin, and in addition, haemoglobin is apparently oxidized more slowly in the partly dried tissue.

Other factors influence the rate of oxidation of haemoglobin to methaemoglobin, for example, pH and the pressure of oxygen. The rate increases rapidly with decreasing pH.[2, 3] The very rapid discoloration of meat which has been in contact with brine is mainly caused by a change in pH and, to a much smaller extent, a "salt effect." The large increase in ionic strength due to the penetration of sodium chloride into the superficial layers of the tissue lowers the pH of the buffers present. Given a sufficiently high concentration of sodium chloride, the rate of oxidation of haemoglobin may be increased four to five times.

The influence of the pressure of oxygen on the rate of oxidation is interesting from the point of view of the mechanism of the reaction. The rate increases with decreasing pressure, and reaches a maximum at low pressure (of the order of 4 mm. of O_2 at 0 deg. C.).[1, 5] The quantitative relation is important in fixing an upper limit to the concentration of carbon dioxide which can be used over a given period in the gas-storage of meat.

As already stated, the absence of oxygen in the interior of the muscular tissue of bacon insures the stability of the pigment, nitrosohaemoglobin.[6] It also plays an important part in the process of fixing the color. The action of nitrite on haemoglobin in the presence of oxygen is not yet clearly understood; whatever the products, nitrosohaemoglobin is not the chief one, and the color of the resulting mixture is usually brown and, in some cases, green.

In the absence of oxygen, nitrite reacts with haemoglobin in aqueous solution to give one molecule of nitrosohaemoglobin and one of methaemoglobin.[7] Again the color of the mixture cannot be considered good. If, however, a reducing agent, e.g., sodium hydrosulphite, is also present in the solution, nitrosohaemoglobin is the sole product. These latter conditions are found in the interior of the muscular tissue during curing; in the absence of oxygen, tissue maintains a low value of the oxidation-reduction potential (E_h is the order of —0.2 volts), and haemoglobin is changed completely to nitrosohaemoglobin.

The reaction of nitrite with haemoglobin is relatively slow over the pH range 7.8 to 7.2, but the rate increases with decreasing pH, and is rapid over the range 6.6 to 5.2. The reaction is very rapid at the concentrations of salt and pH found in muscle during curing; the time required for the fixation of color must be attributed to the time necessary for adequate diffusion of nitrite into the tissue rather than to any property of the reaction.

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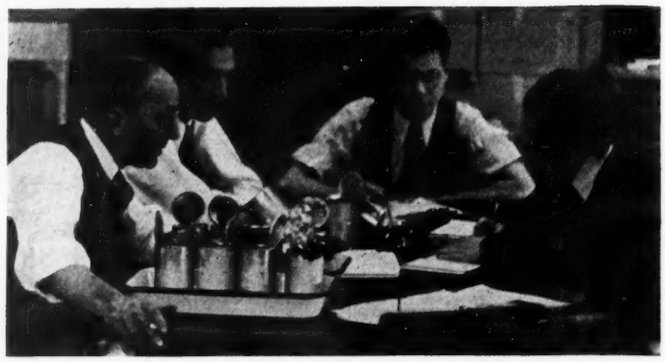
* Taken from an address before the Food Technology Conference, Massachusetts Institute of Technology, Cambridge, Mass., Sept. 14 to 17, 1937.

How Can Company Research



Helps the Food Manufacturer

By WILLIAM H. HARRISON*
Director of Research
Continental Can Co., Chicago, Ill.

AS ORGANIZED and operated today, the research departments of the major can companies are somewhat less than twenty years old. Previously, the need of such departments was beginning to be appreciated, and much preliminary work was done by the men with scientific training then employed by the can manufacturers. Today, the work done by these departments is very comprehensive in scope and covers many of the problems having direct bearing on the manufacture of the cans, and most of the problems directly or indirectly related to the uses of them.

Raw Products Specialists

The problems arising in the canning industry, in the solution of which the research departments of the can companies cooperate with the canners, may be classified into three groups: (1) those which affect the industry as a whole, either directly or indirectly; (2) those which affect but one item or a class of canned foods; and (3) those which relate specifically to an individual canner.

Since success in canning is so dependent upon the character of the available farm and orchard products, the research departments of the can manufacturers utilize the services of experts in agriculture. The chief purpose of employing these specialists is to promote improvement in the quality of the raw products which are canned, and to aid in their abundant and economical production. This is done by maintaining contacts with the various experiment stations of the United States Department of Agriculture, the Agricultural Colleges engaged in research on fruit and vegetable culture, plant breeders, and other similar agencies. The secondary duties of the raw products specialists include making service calls on customers having an agricultural problem calling for prompt solution, exploring new production territories for contemplated canneries, developing and disseminating information on effective methods of controlling plant diseases, and combating insect infestation.

The research departments of the can manufacturers cooperate actively with the research laboratories of the National Canners Association in the solution of problems affecting the canning industry as a whole, those affecting a section or group, and those affecting the canners of a specific commodity.

National Canners Association Bulletin No. 261, available to all canners, contains recommended processes for the principal non-acid canned foods. These are based upon the mass of heat penetration data, information on the results of resistance of spoilage organisms, results of studies of commercial practices, etc., accumulated by the research departments of the can manufacturers during the course of their research and service activities, as well as on data similarly obtained by the Association. The publication also contains recommendations on equipment for processing retorts and other recommendations similarly based.

Obviously, spoilage of commercial significance in canned foods has an adverse effect on the industry as a whole. A great amount of the work done by the research departments of the can manufacturers is effective in minimizing such spoilage.

The McNary-Mapes standards of the items for which such standards have been promulgated have resulted from much scientific work to which the research departments of the can companies have contributed no little part.

The staff microscopists of the research departments have rendered material assistance to the industry by instructing cannery technicians in mold count, insect fragment count, and similar determinations. Frequently schools of instruction are held on subjects relating to canning operations. These are held in cooperation with canners associations and with the State agricultural colleges.

Studies are made on sources of contamination resulting in poor or off flavors, undesirable color, or spoilage. Usually these studies are made for the purpose of eliminating the undesirable results being obtained in a specific cannery. The results of such work are not published, but in time become available to the industry as a whole.

Canned Corn Work

Canned corn, a typically American product, has been canned commercially since about 1850. At first, the commercial packs were what we might now describe as "whole grain corn of poor workmanship." Later, mechanical cutters with scraper attachments were developed and the Maine, or cream style, pack was introduced. This kind of canned corn constituted and continues to constitute the great bulk of the annual corn pack, which totals approximately 15,500,000 cases.

In Maryland and the other states of the Tri-State area, an improved pack of whole grain corn was developed.

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* *Based on an address made before the Food Technology Conference, Massachusetts Institute of Technology, Cambridge, Mass., Sept. 14 to 17, 1937.*

This consisted of the kernels, substantially whole, cut from the cob by hand or by machine, canned in a fairly free liquid containing enough salt, and with or without added sugar, to season. Some corn on the cob was also packed in a similar liquid, but was not popular because of the diffusion of undesirable flavors from the cob into the liquid and into the kernels.

New Interior Enamels Avoid Discoloration

Cans of plain tin were used exclusively. The formation of iron sulphide in the cans and on the product, as the result of reaction of sulphur compounds in the corn with the exposed minute areas of iron in the plain tin container, caused much criticism and concern. In fact, by some it was felt that the corn canning industry could not survive. Extensive research was undertaken by the National Canners Association in which the research departments of the can manufacturers participated. A solution to the problem was found, and the resulting C-enamel can was developed by the can manufacturers. The use of this container has been extended to many other items of canned food, including lobster, shrimp, certain packs of meats and meat products, fowl, and also to several items of other vegetables. Today, troublesome iron sulphide discoloration is practically unknown in these products.

The use of the C-enamel can eliminated the container problem of canned corn, but consumer demand still lagged. Did the housewife look upon canned corn as plebeian, or did the product and available sizes of packages fail to meet the needs of that mass of consumers whose modes of living and tastes had changed? The best minds of the industry were applied to the solution of these and related problems.

Previous research work had demonstrated the practicability of securing sterility in a canned food consisting ot units or pieces, uniform and small in size, such as peas, whole grain corn, and the like, by placing such material in the can, introducing only enough water to be assured of the presence of sufficient saturated steam during retorting, sealing the can under a substantial vacuum, and processing the sealed container. The information became available to the canning industry.

New Technic Lowers Shipping Costs

A corn canner with vision, favorably located from the standpoint of raw product and other production requisites, but not so favorably located from the standpoint of freight rates, saw the possibility of employing this procedure in developing an improved pack of whole grain corn, which, in addition to other desirable features, materially reduced the shipping weight per unit of corn. Cooperation of a research department of a can manufacturer was secured, and a new style of pack known as "Vacuum Packed Whole Grain Corn" was perfected, and the required container and the necessary vacuum sealing equipment developed.

The most generally used size of can for whole grain corn canned in liquid is $3\frac{7}{16}$ in. in diameter by $4\frac{9}{16}$ in. tall, holding 20 oz. net, of which approximately 14 oz. are corn and 6 oz. are free liquid. The new product, packed largely in cans $1\frac{3}{16}$ in. shorter, holding 12 oz. net, contains only sufficient free liquid to be assured of the presence of adequate saturated steam in the can during the retorting process and maintaining optimum moisture content of the finished product. In this style of pack, the diffusion of the flavor from the kernels into the liquid is reduced to a minimum.

The problems solved by scientific research included the determination of the kind and amount of liquid to be added to the corn at the time of canning, development of specifications covering the size and shape of the container, which is sealed under a vacuum of 1 to $1\frac{1}{2}$ in. less than the barometer, decision on required vacuum sealing equipment, and means of maintaining the required vacuum. Additional research in developing the pack included the determination of minimum safe and optimum sterilizing times and temperatures and retorting practices, which, incidentally, vary somewhat from the customary retorting procedure.

Vacuum Packing

A second new product, "Vacuum Packed Corn on the Cob," was also developed. The canning procedure is similar to that employed for vacuum packed whole grain corn. The pack consists of four or more ears per can, sealed under a substantial vacuum, and sterilized in the presence of a minimum quantity of liquid. To can four ears of corn in a container $3\frac{7}{16}$ or $3\frac{3}{4}$ in. in diameter by $5\frac{1}{2}$ in. tall called for the development of strains of sugar corn which would consistently yield ears of the required diameter and desired length. Research by the raw products specialists of the canners made this possible. Ordinary cans $3\frac{7}{16}$ or $3\frac{3}{4}$ in. in diameter by $5\frac{1}{2}$ in. tall will not withstand sealing and subsequent handling under the required substantial vacuum. Specifications for the desired cans were developed by the research departments of the can manufacturers.

While these changes were taking place, the excellent whole kernel brine packs of Golden Bantam and of the hybrid yellow varieties were being developed in Minnesota, and the markets for them established extensively. In the canning of these packs, operating efficiency was increased by using the vacuum sealing machine in lieu of the exhaust box.

Agitating Cook Reduces Time

Producing a No. 10 can of cream style corn of the desired color and flavor had long seemed impossible. In "still" retorts, a process of 180 minutes at 240 deg. or its equivalent is required. This results in marked caramelization of the portions of the contents adjacent to the container, and, following the cooking period, a long time is required for properly cooling the cans under pressure. Research on the effect of agitation developed the fact that a No. 10 can of cream style corn, agitated under certain conditions, could be processed and cooled in about 50 minutes. The resulting product is sterile and possesses the fine color and the fine flavor characteristics of a No. 1 can of the same product. This process is also being used commercially.

Work on Shrimp

A few years ago, the shrimp canning industry of the Gulf Coast experienced considerable difficulty with canned shrimp, resulting from many causes. A survey indicated the necessity of studying the effect of the fishing and canning practices then employed. This was done in cooperation with a Shrimp Section of the National Canners Association formed for that purpose. Studies made indicated the desirability of instituting numerous changes in practices. These included improved fishing practices, better methods of preservation of the shrimp during transportation from fishing grounds to canneries, more careful examination of deliveries from fishermen, establishment of a better cooperative relationship between the canners and the fishermen, improved cannery sanitation, improved methods of washing and soaking of the picked shrimp, and standardization of retorting practices,

These changes were suggested and have been put into effect by the shrimp canners, with the result that there has been marked improvement in the quality

(Turn to page 736)

Problems Yet to be Solved *In the Dairy Industry*

By H. F. JUDKINS *

Vice-President,
Sealtest System Laboratories, Inc.,
New York, N. Y.

PROBLEMS in the fluid milk business begin with the production of milk on the farm. Milk is produced on millions of farms ranging in size from those having very small herds, which are carried as a side line, up to the specialized dairy farm with its large herd. From this statement it may be seen at a glance that there must exist such problems as the uneconomical low producing cow, getting a satisfactory milk quality, and handling surplus on a production poorly distributed throughout the year. Dairy herd improvement associations operated under the direction of the United States Department of Agriculture, and the extension services of the different states, have been a help in improving the production per cow, but still less than 2 per cent of the cows in the United States come under dairy herd improvement associations. Also, the average cow today does not produce appreciably more milk than ten years ago, namely, 4,000 lb. per year, which is less than one-half the amount required for real profitable production. The statement is all too true that too many farmers will continue to produce milk if they can get their cost of feed or very little more out of it.

Great strides have been made in the improvement of the quality of milk, but much remains to be done, especially with the keepers of small herds. Legislation having to do with the production of clean and safe milk has been enacted by all of the states and many municipalities. It is unfortunate for the producer, distributor and consumer that there is not more uniformity to these regulations. The facts concerning the facilities and methods necessary for a safe, clean, cold milk supply of good flavor are well known. It is simply a matter of getting these facts over to the producer and then making it impossible for him to find a market for his milk unless he has the proper facilities to do with and will consistently practice the proper methods.

Because of the fact that much more milk is produced in summer than in winter, and because of the fact that consumption is relatively uniform the year around, there exists the problem of surplus and buying milk on a sound basis. Buying plans too numerous to mention, including legislative attempts to set up a basis of buying milk satisfactory to all concerned, have been tried to no avail. Most of these plans operate on the idea of paying the producer one price for an established basis, and another price for his surplus, or paying him a classified price depending on how the milk is used. These prices are determined either by the usage of an individual company, or on the basis of a market pool determined by the usages of all the distributors in the market. It is probable that the problem of a satisfactory buying plan will provide exercise for the minds of our children, grandchildren and great-grandchildren.

M. E. PARKER, production manager, Beatrice Creamery Co., addressing the Food Technology Conference on butter making.

Vast improvements have been made in transportation of milk in insulated tank trucks and cars. A more recent development which holds promise is the use of smaller insulated tanks which can be placed on trucks or tank cars and run into the plant and used as storage until the milk is processed, thereby saving the movement of the milk through extra piping by pumps or compressed air.

In the plant there have been marked improvements in processing, particularly in the development of stainless steel equipment, which is now coming into universal use.

I feel that faster progress might be made if representative men in the industry would cooperate more with the builders of machinery and equipment instead of leaving it largely up to the equipment manufacturer to work the thing out alone and sell the industry what they think it should have. There is still room for much improvement in the development of machinery for specific processes, such as the manufacture of buttermilk, the handling of cream and the simplification of the pasteurizing process.

The phosphatase test for determining the thoroughness of pasteurization is being worked on experimentally and appears to hold considerable promise.

Until recently, there has been little change in the milk bottle for many years, or in the milk bottle case. The milk bottle expense is a large item, especially in the wholesale business where a deposit bottle is not used, and it may be that a glass bottle with a smaller top, or the paper bottle, will eventually be worked out to reduce this expense. Bottle cases are heavier than should be necessary, and most of them are not constructed in a way to protect bottles from breakage to the fullest extent.

Cream is an important product of the milk plant, and there is room for work on this product so that it will run more uniform in body, not showing a skim milk separation in the bottom of the bottle, or a plug of fat at the top of the bottle, or feathering in coffee, and will whip easily if it is supposed to whip.

The problem of cappy or cardboard flavor in milk is still with us and crops up in various plants especially during the winter months. Probably as much work has been done on this problem as any other problem in recent years, but we do not have the entire answer.

Evaporated Milk

Evaporated milk, which is whole milk condensed approximately two to one, has been constantly gaining in favor, especially for cooking purposes. From 1920 to 1936, sales of this product increased three-fold. The spread between the price of evaporated milk and fluid milk is as great as it is because

(*Turn to page 737*)

* *Based on an address made before the Food Technology Conference, Massachusetts Institute of Technology, Cambridge, Mass., Sept. 14 to 17, 1937.*

Puritan beans in present package (right), and contemplated container which it is anticipated may discourage reuse applications.

NEW CONTAINER
Solves Expansion Problem

HOUSEWIVES are singularly susceptible to new and novel reuse containers, which for them have a "something for nothing" appeal they cannot resist. Manufacturers through the aid of reuse containers endeavor to convert competitors' customers to the use of their own products. They hope to hold most of these converts even when the generally costly reuse container is abandoned. The plan frequently fails. The end comes not when the housewife's taste for the product has weakened, but when her desire for the reuse container is surfeited.

The history of food merchandising contains many a classic example of a product's dizzy climb to consumer acclaim through the emyployment of a reuse container. The sequel to this type of sudden popularity, with but rare exception, is an equally sudden plunge to obscurity. Singularly, this slump often starts when sales are at the peak and the warehouse heavily stocked with reuse containers.

Exceptions, when the reuse containers remain in favor and establish permanent markets for products packed in them, are worthy of note.

The Maine Canning Company of Portland, Me., has for a quarter of a century packed New England type oven-baked beans in tin containers. Until this year most of the distribution was through private-label distributors, less than a third of the product reaching the trade under the manufacturer's own brand. Beginning this year, the Maine Canning Company offered its fourteen-hour oven-baked beans in a bean-pot-shaped glass jar under the trade name "Puritan Beans." Throughout the history of packaged New England oven-baked beans, there has been a stubborn sales resistance to them outside New England and adjacent markets. The price differential between New England beans and others has been largely responsible for this sales resistance. During winter months when New Englanders are vacationing in Florida, there is a lively market there for New England baked beans. The market vanishes when the New Englanders return North.

Puritan beans in brown pebble-glass pots, even though the product carries a price differential above the company's product packed in tin, has obtained a consumer acceptance not only in New England where the oven bean is a staple, but in mid-continent and Western markets. When the label, which is not glued to the pot, and the cap are removed, the pot (and contents) may be heated in the oven or in hot water and used as a serving dish on the table. The pot has reuse possibilities for other food items. It has also been used by housewives for the storage of staples on the pantry shelf, as a vase for flowers and as the base for table lamps.

The Maine Canning Company pack this year under the Puritan label is expected to exceed three times the pack of previous years, and this in addition to the company's regular pack. The demand for the product by jobbers and wholesalers, when it was offered to the trade a year ago, far exceeded the company's expectations and the plant's capacity to produce. Since that time the plant has been enlarged and additional ovens have been installed.

The Maine Canning Company anticipated the possibilities of a waning of the popularity created by a novel container. They have fortified themselves with prospective merchandising plans in the event of such a market sag. No drastic slump has heralded the housewife's whim to abandon a new and novel container. Apparently the Maine Canning Company has established a national market for New England oven-baked beans in a glass bean pot suitable for service at the table and having other reuse possibilities.

New ovens were necessary to accommodate the production demands for Puritan beans in the new, glass, table bean pot.

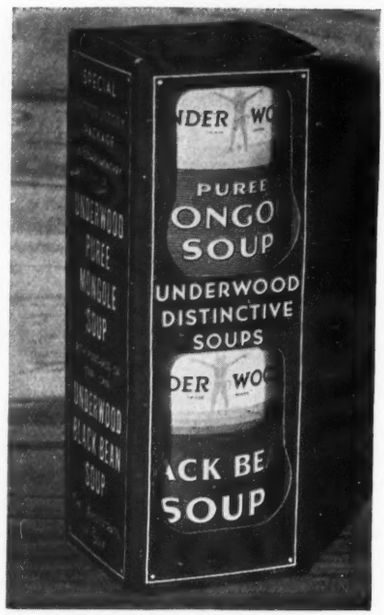
Merchandising HINTS AND HURDLES

Everybody's Labels

MANUFACTURER, wholesaler and retailer affiliates of the "Plee-Zing" Stores organization met in annual convention in Baltimore recently to solve their common problems and further their mutual interests. The "Plee-Zing" organization, generally classified as a voluntary chain, operates under policies at variance with most organized groups classified as voluntaries. The affiliation, which includes manufacturers and wholesalers located throughout most of the states east of the Rocky Mountains, differs most markedly from other voluntary groups because of its private-label policy.

According to Gordon C. Corbaley of American Institute of Food Distribution, Inc., the parent association of voluntary groups, "voluntary chains . . . . have been organized by wholesale grocers, usually for the purpose of developing better retail outlets for their *own brands*. Their primary interest is in their own brands because these carry a profitable mark-up and because these brands are important in holding the loyalty of retail members." The Plee-Zing brand is at once the property of the distributor and the manufacturer. It is not the exclusive property of either group, regardless of where the proprietorship is technically or legally invested. Each Plee-Zing item, whether it be peas, pickles, pears or prunes, carries the name of the manufacturer who produced it. The manufacturers who produce the Plee-Zing brand, the wholesaler-distributors, and now the retailers, meet once a year to solve their common problems and further their mutual interests.

Interviewed at this year's Plee-Zing convention were many manufacturers who provide private labels for corporate chains and other voluntaries as well as Plee-Zing. Some of them have been manufacturers of Plee-Zing labeled products since the organization of the affiliation. All were in accord in expressing approval of the system which permits the manufacturer's name to appear on the label with the distributor's brand name. They offered three reasons: (1) This method eliminates much of the chiseling. (2) The manufacturer has an increasing market for his *best grade* products. (3) It is difficult to replace his products by those of other manufacturers because of the trade acceptance built upon his name on the label as well as the brand name of the distributor.



William Underwood Co., Boston, Mass., has recently introduced a number of new products by allowing the known to introduce the unknown. This is a type of introductory sampling which appeals to the distributor. The new product with the words "Sample, Not for Sale" stamped on the label is packaged in a combination package with a popular member of the family, both selling for the price of the known item. The introductory package has cut-out windows to display the labels of both the old and the new products. A recent member of the family was "Puree Mongole Soup," which rode to the market on the back of the better known product, "Black Bean Soup."

Wholesalers were favorable to the system because they not only have a partial proprietorship over a label, but also because they are selling products they can back to the limit. To the wholesaler and retailer, the manufacturer's name on the label is a guarantee of standardization and uniform quality which the manufacturer cannot afford to lower. Several manufacturers supplying Plee-Zing brands are manufacturers of a variety of food products, some of which are duplicated by other Plee-Zing manufacturers. Retailers report a definite consumer preference where a Plee-Zing item is manufactured by more than one manufacturer, selection of the preferred item being determined by the manufacturer's name on the Plee-Zing label. This system if adopted by other groups might cure many private-label headaches for both manufacturers and distributors.

Mr. McIntosh Comes to Town

CAPITALIZING on the recent growing interest in the "Big Apple" dance, discovered in this deep South and promoted by Arthur Murray, the New York and New England Apple Institute is supplying spectators at apple-dance performances with bright red, cellulose-wrapped, sample McIntosh apples. Sixteen thousand patrons of the RKO theatres during the period of apple-dance performances received McIntosh apples. When the Big Apple exhibitions were held in Rockefeller Center's Rainbow Room, patrons found on their tables gift-wrapped McIntosh sample apples. New York and New England apples are following Big Apple exhibitions at Statler Hotels from New York to St. Louis. Throughout the country where apple-dance exhibitions are held, McIntosh gift-wrapped apples go as favors to the patrons. Publication editors throughout the New York metropolitan area also have received their gift-wrapped McIntosh *via* Western Union. We editors may be a bit too old for the Big Apple, but we certainly fell for the little apple.

Cincinnati-survey Returns

THE FINDINGS of the 1936 Parent-Teacher Association survey made for Scripps-Howard's *Cincinnati Post* indicated the extent of the supermarket movement in at least one locality, Cincinnati. The 1937 survey, conducted by the same P.T.A., indicates trends not without significance. The supermarkets are growing both in number and popu-

larity. The voluntaries are in almost stationary position, losing slightly in members but gaining a little in volume. Independents are increasing in numbers and percentage of total volume. The corporate chains are losing ground perceptably.

In addition to store data, the surveys indicate consumer brand preference.

Parent-Teacher Association surveys made for the *Cincinnati Post* indicate the trend of Cincinnati food-buying habits.

Each retail outlet's indicated proportion of retail sales

	1936 (Per Cent)	1937 (Per Cent)
Kroger	20.1	15.7
Albers supermarkets	9.5	11.9
A. & P.	7.7	5.6
Schneider Grocery Co.	5.1	4.7
Pay'n Takit supermarkets	4.3	3.4
Piggly-Wiggly stores	2.2	1.2
Voss Grocery Co.	1.6	1.2
White Villa Stores (voluntary)	6.8	6.9
Other chains	2.1	4.8
Independents	40.6	44.6

Number of retail outlets operated by each group.

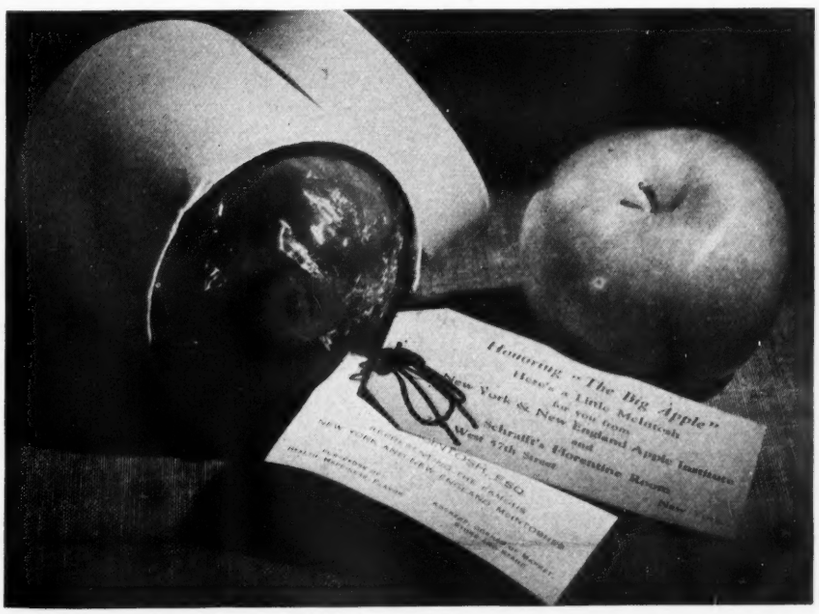
	1936	1937
Corporate chains		
Kroger	251	192
A. & P.	87	67
Schneider Grocery Co.	72	90
Albers supermarkets	8	12
Pay'n Takit supermarkets	7	8
Burke stores	56	38
Voss Grocery Co.	29	27
Peoples Packing Co.	21	20
Total	531	455
Voluntary chains		
White Villa stores	400	400
Dot stores	156	156
Plee-Zing stores	45	40
Regal stores	25	14
Total	626	535

New Bakelite device for opening cans containing beer, fruit juices, and condensed milk and pouring contents without spilling.

Each P.T.A. member who filled out a questionnaire provided an inventory of the packaged staples on her pantry shelves. When all the Scripps-Howard surveys now being conducted in sixteen metropolitan areas are completed, they will be a source of considerable enlightenment to food manufacturers, whether or not their products are reaching consumers in any of these areas under the manufacturer's own name or of his private-label distributors.

Sauce with Dietetic Value

THE FRUIT AND LEAVES of *Carica papaya,* commonly known as the papaw, have long been popular aids to culinary perfection in the South Seas countries. There the housewives employ the papaw, both the leaves and the fruit, to tenderize tough meats. Now the Institute for Physical and Chemical Research, Tokyo, announces the perfection of a process by which a sauce containing papain is prepared from the papaw. This papain, an enzyme, converts the albuminous substances in meats into peptone and amino acids. The enzyme also acts as catalyst in the presence of diastase, speeding the conversion of starch to sugar. In view of the present high prices of animal products, American housewives will welcome that which will tenderize the tougher but cheaper cuts of meat. Their preference will be for an aid to meat preparation rather than an aid to meat digestion, in the interest of economy and culinary art.



With a card of introduction attached, McIntosh apples were recently introduced to patrons of Big Apple dances in Eastern and Midwestern cities.

Ask Rate Cuts for South

THE GOVERNORS of Alabama, Florida, Georgia, Kentucky, Louisiana, Mississippi, North and South Carolina and Tennessee have filed a complaint with the Interstate Commerce Commission asking for the privilege of lowering the rate from Southern classification territory to Northern markets. This rate reduction, if granted, will apply only to freight moving from the South to the North, a reduction of about 40 per cent from the present rate structure. Among the food products that may benefit from this rate reduction if granted, will be dairy products, butter, cheese, canned goods, molasses and syrups. Southern manufacturers of these products will welcome such a rate reduction. The railroads and Northern manufacturers will oppose it.

New

Fresh-parsley Substitute

GROUND PARSLEY, a vegetable concentrate, is now offered to the trade in 1, 5 and 22-lb. containers by the Von Goehee Laboratories, South Hanover, Mass. The product, a green vegetable dust, is made from selected varieties of parsley. One part of the concentrate equals in aromatic strength fifteen parts of fresh parsley. The product is of interest in restaurant and hotel cuisines, because it can be used for garnishing as well as flavoring purposes, when not heated above 200 deg. F. Since it retains a parsley color and flavor indefinitely, if kept in a closed container, the product provides a satisfactory fresh-parsley substitute at all seasons of the year.

Related Items Sell Cheese

KRAFT-PHENIX CHEESE CORP., Chicago, recently placed on the market "Kraft Dinner," consisting of macaroni and Kraft grated American cheese packaged in the proportions required for preparing a macaroni-and-cheese dish. Instructions for the preparation of this dish require no baking of the macaroni and but nine minutes for preparation. Kraft Dinner is uniquely merchandised to consumers who purchase other Kraft products. On the lids of various Kraft products, such as mayonnaise and salad dressing, are lithographed reproductions of the Kraft Dinner package. The product is also being introduced in certain sections of the country through the use of demonstrators.

Chili Powder in Wax Peppers

A RED PEPPER molded of wax is the container adopted by Molded Products Co., Buffalo, for chili-con-carne seasoning powder. One red pepper container of "Wonder Pack" seasoning is the suggested amount of seasoning for six servings. Wonder Pack, a five cent seller is packed three to each special display cardboard container.

New Name Spurts Sales

AFTER TWO AND A QUARTER CENTURIES of successful conservatism, Crosse & Blackwell, London and Baltimore, has found it profitable to depart from centuries of tradition to conquer the American market. C. & B. "Fish Pastes," with a history reaching back many, many years both in British markets and in this country, faced a rapidly dwindling market in the United States until recently. The products that had been packed in 3½-oz. glass jars, to sell for 35 cents at retail, were repackaged in small 2-oz. tins, transparent-cellulose wrapped, and with the new name "Hors d'Oeuvres Pastes." The product at present retails in tins at 15 cents for 2 oz., compared to the product formerly packed in glass at 35 cents for 3½ oz. Sales increases of several hundred per cent have converted a comparatively dormant line into a volume producer.

PACKAGES AND PRODUCTS

Recipes to Aid Jam Maker

NATIONAL FRUIT PRODUCTS Co., Washington, D. C., is stimulating the sales of "Whitehouse" acidulated and concentrated fruit pectin through the use of a book of recipes held in place on the back of the glass bottle container, by means of transparent cellulose. The transparent cellulose gives visibility to label and recipe book and at the same time insures that the book of recipes will remain attached to the container. A line and information on one side of the bottom indicates the contents of the bottle in half-cups.

Dual-use Fasteners

MANUFACTURERS AND RETAILERS who are packaging products for retail sale in paper bags are using metal clips as fasteners, not only to serve as a satisfactory closure but to state the net weight of the contents and indicate the price range. The closure clips come in a variety of colors, each one of which is used to designate to the retail clerk the price of the bag's contents. Each clip also informs the consumer of the net weight of the package. In the food field, this clip has an application in packaging bulk candy, potato chips, nuts and similar items.

Prepared Dinner in Cans

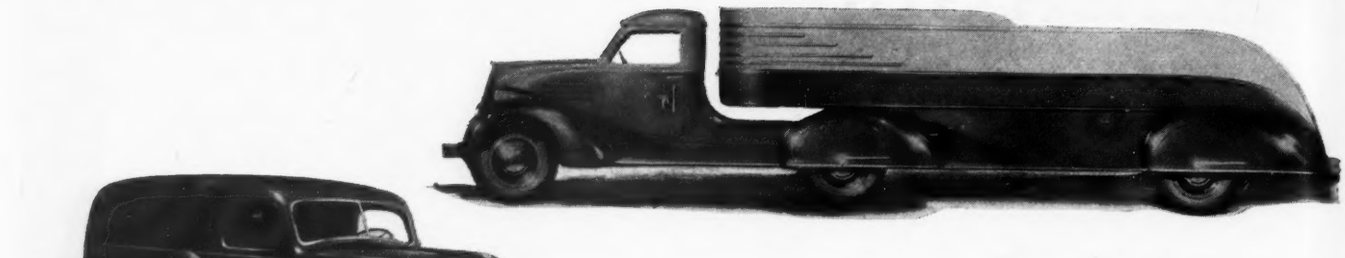
FRIEND BROS. Co., Boston, from whose brick ovens have come fresh bread, brown bread and baked beans, has recently introduced to the market another product, "Brick Oven Baked Pot Roast Beef Dinner." This product enters a field with little specific competition, the field of complete meat and vegetable dinners in one container.

Ghost of Chromo Returns

A. & P. VOLUME was built on the use of premiums, china, chromos and other household-item inducements. When in 1912 the little red-front units began mushrooming over the countryside, the use of premiums faded from the A. & P. merchandising program. Recently, premiums have again made their appearance in A. & P. stores. To obtain these premiums it is usually necessary to mail coin and fill out a card. The resulting mailing list will not be without strategic as well as intrinsic value.

Waffle-like Cheese Canape

A CHEESE-FLAVORED CANAPE that resembles in appearance a miniature waffle is the new product of King Kone Co., New York. Illustrations on the lithographed can suggest that "Crun-Cheese Toasted Cheese Waffies" be used with milk for children's lunches, alone as a cocktail-party canape or as the base for *hors d'oeuvres* spreads. Crun-Cheese has had popular acceptance in New York and adjacent markets, according to reports from retail stores.



OPERATING COSTS for *TRUCKS*

What they should be . . . How to reduce them

NOTHING IS MORE IMPORTANT to the operators of trucks and commercial cars than low operating costs, if distribution expense is to be kept at a low figure. Suggestions as to what may be wrong if costs are too high are given in the following symposium by executives who operate trucks in the food industries.

Motor Analyzers Cut Costs

In the matter of operating cost, the figures noted below are net operating expense per mile, excluding depreciation, license, insurance and driver's pay, which vary in different organizations depending on the scale of pay in the territory and the method in which depreciation is applied: a 1½-ton truck carrying 6,000 lb., $0.026; a 2½-ton truck carrying 12,000 lb., $0.03; a tractor and semi-trailer carrying 20,000 lb., $0.034.

If the operating cost of a truck or commercial car is too high, these steps should be taken as a means of reducing it: Investigate the driver's method of operation. Employ careful mechanical analysis and check-up of motor unit periodically. Analyze road conditions over which vehicles travel. Investigate to see that equipment is proper for the job.

The way the individual driver handles his vehicle has a decided effect on the operating cost.

With the proper use of modern motor analyzers at frequent intervals, motors may be kept operating on a very efficient basis, not only making it possible to save money in gasoline but also save time by increasing motor performance.

If certain vehicles of a fleet fail to obtain the expected gasoline mileage, even though of the same make as vehicles giving satisfaction and though tested and approved for efficiency and operated on normal routes, three things primarily must be investigated —road conditions, the driver and the load—R. F. GRAY, *Transportation Manager, Geo. A. Hormel & Co., Austin, Minn.*

Operator a Big Factor

We operate ½-ton trucks in the house-to-house baking business and 1½-ton models in the wholesale, or store-to-store business. The cost per mile of operating the ½-ton trucks is greater than that of the 1½-ton models in some instances, and in no instance is it greater for the 1½-ton trucks. This, of course, is due to the fact that the ½-ton jobs on the retail, door-to-door work average approximately 250 to 300 stops per day with an average of perhaps 50 miles per day, while the 1½-ton models stop on the average of 50 times per day with an average of 60 miles. It can be readily seen that the difference in costs is due to the numerous stops and starts.

We believe that the individual driver has the biggest effect upon operating costs, whether it is high or low.

All of our garages are equipped with vacuum gages for making motor tests. We find that this is the shortest way to efficient adjustments of the carburetor and engine. The exhaust type of analyzer I believe is good, but it is more technical and takes longer for a first-class job. What experience we have had with this type of analyzer has been in demonstrations, which were interesting but did not sell us on their efficiency.

If two trucks that are of the same adjustment and type do not return the same results from gasoline mileage, it is as a rule the fault of the operator. We find that where the human element enters, we have a variation on the same truck, to say nothing about two trucks.—R. D. BOYER, *Superintendent of Motor Vehicles, Hathaway Bakeries, Inc., Cambridge, Mass.*

Drivers Can Reduce Costs

We believe that some of the drivers operate a truck the same as they do their own car, and this saves greatly on operating costs. However, we find that usually the best salesmen are the worst drivers.

As regards motor analyzers, we have not had good results with same.—J. J. VAUGHN, *Frisbie Pie Co., Bridgeport, Conn.*

Distribution QUESTIONS CLUB

The Odds Are Against the "PUSH DISCOUNT"

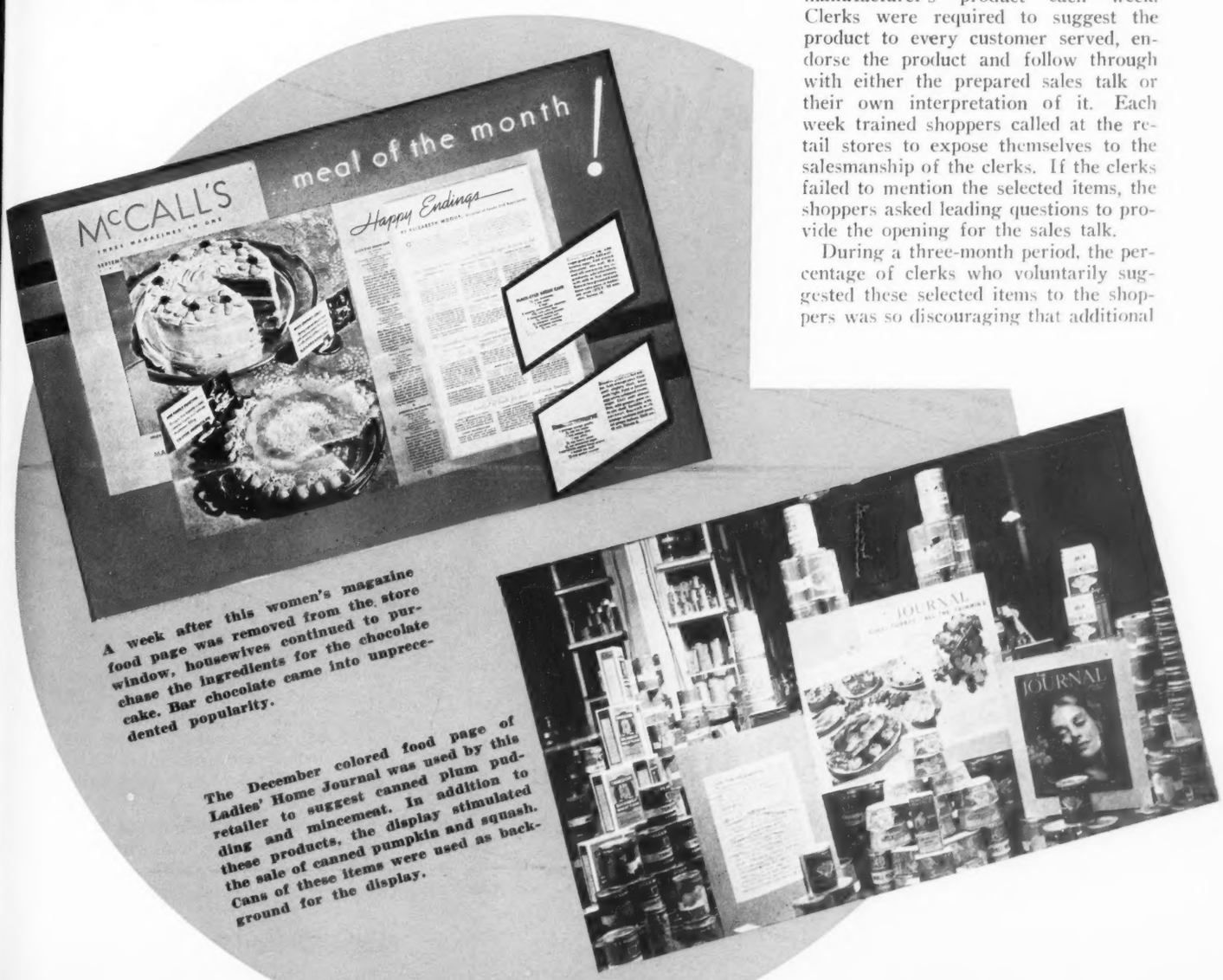
NOT ALL THE PRODUCTS of grocery manufacturers get the endorsement and special sales effort of chain-store clerks. The retail clerk in the chain store (corporate or voluntary) is an order taker except when he indulges in the delightful pastime of making up the customer's mind in favor of his company's private-brand merchandise. Acting on orders from management, he also performs another function. He suggests to each customer he serves the purchase of a designated manufacturer's trade-branded product. He endorses the product and follows the endorsement with a short but convincing sales talk. For this service (and others) the manufacturer pays the management a special discount, often referred to as the discount for "pushing" or the "push discount."

Some manufacturers consider this discount and the services that come with it essential to the maintenance of sales volume. Others at least question the value of clerk influence. The subject is highly debatable. Manufacturers find it difficult to measure separately and accurately the services rendered them by the organized retailer. If the chains have accurate data on the value of each service they perform, they have not made it public. They merely charge for services all that the traffic will bear.

One organized group of retail outlets has attempted to measure the value of its merchandising services, not to the manufacturer but to itself. This was done by means of a study of retail clerks and their efficiency. The object of this study was to determine not only to what extent clerk influence could increase total sales, but also what fundamentals of character, racial traits and occupational training were common to the most successful retail clerks. Though the object of this study was to determine methods of increasing sales efficiency and profits through increased store volume, nevertheless the data collected contains findings important to all grocery manufacturers.

The management of this group of retail stores provided each retail clerk with a weekly sales bulletin. Instructions in this bulletin required the clerks to concentrate sales efforts on one branded manufacturer's product each week. Clerks were required to suggest the product to every customer served, endorse the product and follow through with either the prepared sales talk or their own interpretation of it. Each week trained shoppers called at the retail stores to expose themselves to the salesmanship of the clerks. If the clerks failed to mention the selected items, the shoppers asked leading questions to provide the opening for the sales talk.

During a three-month period, the percentage of clerks who voluntarily suggested these selected items to the shoppers was so discouraging that additional



A week after this women's magazine food page was removed from the store window, housewives continued to purchase the ingredients for the chocolate cake. Bar chocolate came into unprecedented popularity.

The December colored food page of Ladies' Home Journal was used by this retailer to suggest canned plum pudding and mincemeat. In addition to these products, the display stimulated the sale of canned pumpkin and squash. Cans of these items were used as background for the display.

These Food Pages WILL CREATE Impulse Sales

Woman's Home Companion food pages will carry this full-color spread in the January issue.

Ladies' Home Journal food pages will carry this full-color spread in the January issue.

Good Housekeeping spread, appearing in the food pages of the January issue.

Easy homemade breads
Baking powder turns the trick here...
Have you tried the double-yeast method?
BY ELIZABETH WOODY
Happy Holidays to the Gang

This two-color spread will appear in the January issue of McCall's.

Displays built around posters bearing reprints of these women's magazine food pages will increase the sale of food items illustrated on them. Reprints of these pages, mounted to make posters, may be obtained from the respective magazines *(see p. 720).*

Pictorial Review-Delineator three-color food-page spread in January issue.

THE FOLLOWING DESCRIPTIONS of the contents of the food pages of the January issues of the women's magazines are furnished as a guide to those food manufacturers whose products are illustrated in one of them. Some manufacturers will obtain sales stimulation for their product through employing the aid of posters made from reprints of the food pages and distributed to retailers for use in preparing store displays.

LADIES' HOME JOURNAL: Full-color spread illustrates a midnight supper to greet the New Year. This spread furnishes recipes and describes dishes that require as ingredients aspic, tomato juice, olives, shrimp, dried beef, mushrooms, shredded pineapple, citron and hard and jelly candies.

PICTORIAL REVIEW - DELINEATOR: Three-color spread with holiday open-house buffet-luncheon suggestions. These include dishes that call for the use of ham, gelatine, pineapple slices, orange marmalade, canned vegetables and pie-crust ingredients.

WOMAN'S HOME COMPANION: Full-color spread illustrating mincemeat pie, plum pudding and a fruit salad made with shredded coconut. Manufacturers of prepared mincemeat, canned plum pudding and shredded coconut should increase sales with this food page.

MCCALL'S: Two-color spread with recipes and illustrations of "easy homemade breads." This spread is suitable for use by manufacturers of baking powder, yeast, flour, sugar, seasoning and dried fruits—figs, apricots, prunes, raisins and currants. This spread may also be used to sell bakery products.

GOOD HOUSEKEEPING: Two-color spread with recipes for casserole dishes to be made from salmon, dried beef, corned beef, spaghetti, Vienna sausage and tuna fish.

pressure was put on them. Supervisors in sales meetings coached them on selling methods and encouraged them to suggest and sell the selected items. After another three months with no noticeable improvement, all retail clerks were notified of the company's method of checking on them, and on their sales efforts. They were further advised that in the future each clerk would be graded according to whether he suggested the selected items and also whether he followed through with a sales talk. Clerks' sales efforts on the selected items did not improve appreciably during the following six months.

This display was used to direct attention to the suggested uses of pineapple rings in a dish suggested by Good Housekeeping.

This display was used to suggest canned peas. All of the five brands of peas featured in the display shared in the increase in sales.

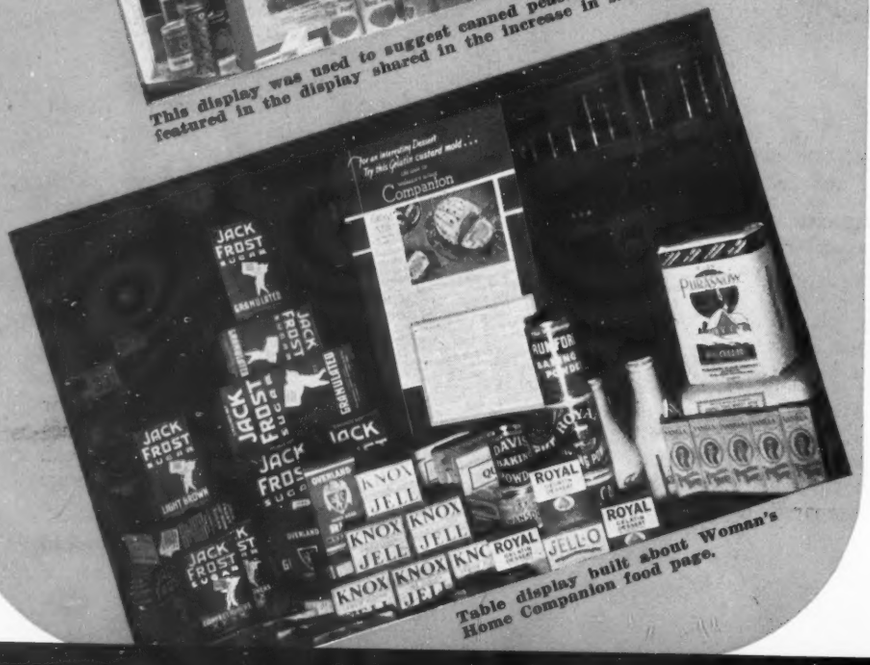


Table display built about Woman's Home Companion food page.

Not only did this retailer group test the sales efficiency of its own clerks, but also the efficiency of the clerks of its organized competitors. Several of the ranking organized groups were included in the study. Competitors' weekly store bulletins were obtained, and competitors' stores were shopped to determine the clerks' sales efforts on the designated feature items. Results from all organized groups varied little.

Throughout the year in which trained shoppers collected data on retail-clerk influence in chain stores, other experiments were conducted in the company's own stores. One test was made to determine how successfully retail clerks followed instructions to suggest related items. Other tests revealed how well they followed instructions in explaining the differences and uses of similar products, viz., pineapple rings, pineapple fingers and crushed pineapple. The results from these tests were no more creditable to the retail clerk than were the other tests. During all these experiments, sales efficiency of the retail clerk, gaged by a liberal standard of measurement, never exceeded 20 per cent.

The value of suggestion should not be underestimated, whether it be oral or silent. However, suggestion can be effective only when applied. The supermarkets with their vast displays use the power of silent suggestion successfully to create extra sales. The power of suggestion can be made effective in any retail food store. Women are singularly susceptible to suggestion. They welcome the suggestions that bring variety and spice to the monotony of their menus. A successful method of creating impulse sales through the power of suggestion was discussed in the October and November issues of FOOD INDUSTRIES. Articles in those issues disclosed the influence of the food pages of the women's magazines, not only in stimulating consumer purchases, but also in obtaining merchandising cooperation of retailers in the form of retail-store displays.

Mounted reprints of these food pages of the women's magazines (single pages on 14x22-in. posterboard, spreads on 28x22-in. posterboard) may be obtained from the magazines ready for use at moderate prices (actual cost) in lots of not less than 1,000.

Each poster will carry the printed line, "As seen in January issue of ..... Magazine." The manufacturer's selection of caption or "selling slug," such as "Try this salad tonight," *"Woman's Home Companion* suggests this dish," etc., will be printed at the top of the poster. No posters will bear the name of a manufacturer or his trade brand.

New DISCOVERIES AND INVENTIONS

METHODS OF PRESERVATION

Gas Storage for Eggs

THE QUALITY OF EGGS stored at 0 deg. C. in atmospheres containing different concentrations of carbon dioxide is being investigated by candling, by tests for palatability and by the usual chemical and physical tests for the white and yolk. The results so far confirm that an atmosphere containing 2½ per cent of carbon dioxide improves the quality of the egg, notably in the yolk. Atmospheres containing high concentrations of carbon dioxide, in the range 60 to 100 per cent, affect the quality of eggs uniformly, the yolks being firmer and the whites markedly more liquid than in eggs stored in air. Eggs have been stored in saturated atmospheres within this range for eight months without spoilage by mold or bacteria.

Digest from Report of the Food Investigation Board for the year 1936. (Published in London, England.)

PACKAGING

Treated Parchment Paper for Print Butter

PRINT BUTTER wrapped in "parchment" sized with oat flour, scored one-half to one point higher than the same butter in untreated parchment after three to five weeks storage at 45 deg. F. There was a slight advantage (0 to 1 point) for the treated paper after five to six months storage in similar trials at 15 deg. F.

Digest from "Improving the Keeping Quality of Butter with Treated Parchment," by C. D. Dahle and D. V. Josephson. Pennsylvania Agricultural Experiment Station Paper No. 777, 1937.

BAKING

Special Salt for Baking

SALT (sodium chloride) is improved in quality, especially for baking purposes, by admixture with a compound of ammonia which will not decompose to liberate ammonia gas. The proportion of added ammonium salt is not large, preferably being only about 5 per cent. As the invention is described in Holland Patent 41,067 (granted July 15, 1937, to Leonard and Eduard Elion, The Hague), good improvement in baking salt is obtained by adding ammonium chloride, phosphate of tartarate.

If there is danger that decomposition and escape of free ammonia may occur, as in the case of unusual baking conditions, a stabilizer for the ammonium salt may be introduced. Such stabilizers (decomposition inhibitors) are found in certain salts which have an acid reaction. Examples are primary sodium phosphate, acid pyrophosphates, persulphates, acid potassium tartarate and similar salts. Citric acid is also effective as a stabilizer for the ammonium compounds in treated baking salt.

Lecithin Emulsions Stabilized by Lactic or Citric Acid

STABLE EMULSIONS OF PHOSPHATIDES, especially of lecithin, are prepared by treating the phosphatide material with a hydroxyaliphatic acid such as lactic acid. An example, disclosed in British Patent 464,100 (granted July 1, 1937, to B. Rewald, 16 Jewry St., Crutched Friars, London), employs a mixture of 35 per cent water and 65 per cent commercial phosphatide (30 per cent oil content), to which is added 20 per cent of a concentrated lactic acid solution. Another stable emulsion may be made of soy bean lecithin 100 parts, water 100 parts and 80 per cent lactic acid 5 parts. Citric acid may be used instead of lactic acid with good results.

The lactic or citric acid may be added to the lecithin and this mixture may then be emulsified in water, instead of adding the acid after the water. *The emulsions are useful ingredients in margarine cheese, butter and other diary products.* If the emulsion is to be used in a product in which its acidity would be objectionable, the acid may be neutralized. Another important use for the lecithin or other phosphatide emulsions is in bakery doughs and batters. For example, from 0.1 to 1 per cent of the emulsion may be added to the flour before mixing the dough or batter.

How Bakers Can Ascertain Consumer Preference

CONSUMER PREFERENCES for bread flavor vary according to locality, so the American Institute of Baking has worked up a series of tests which can be used by any baker or miller to determine preferences for both aroma and taste in his particular section. These were applied to a group in Chicago consisting of both experts and non-experts (since consumers fall mainly among the latter) in a series of 124 varied tests.

Other factors besides ingredients were found to influence flavor, including method of mixing, make up, proof time, baking conditions and freshness. A loaf twelve hours old was preferred to one either fresher or older. Wrapping in wax paper helped, but twelve-hour bread was still found best.

Digest from "Experiments in Determining Bread Flavor," by William H. Cathcart, *Cereal Chemistry*, 14, 735, 1937.

CANNING AND PRESERVING

Water-soluble Pectin

SOLUBLE PECTIN PREPARATIONS are made from fruits, or their wastes or byproducts, by treatment with an organic acid and an alcohol at about 60-80 deg. C. (140-176 deg. F.), and extraction of the remaining residue with water. The fruit material may be, for example, orange peel or cider-press residue, containing pectin in water-insoluble form. The organic-solvent system may be composed of ethyl alcohol and acetic acid, or, if glacial acetic acid is used, the alcohol may be omitted. Instead of alcohol, acetone or ethyl acetate may be used. Instead of acetic acid, an inorganic acid, such as hydrochloric, may be employed.

As disclosed in British Patent 466,-

356 (granted June 24, 1937, to Paul Hirsch, Palermo, Italy), the essence of the invention resides in extracting with an organic solvent as much as possible of the substances which accompany the pectin, so that the residue contains the pectin in water-soluble form. Simple extraction with water then suffices for recovery of the pectin. The particular selection of components and proportions in the organic-solvent system may be varied according to the material to be treated. After the first (organic) extraction, it is well to wash the residue with the organic solvent before proceeding with the final (aqueous) extraction.

What Sterilizing Does to Canned Foods

A COMPREHENSIVE TESTING PROGRAM, carried out for the Norwegian canning industry, has revealed some interesting facts concerning the effects of sterilization on the nutritional value and other qualities of canned foods. In fish products, the carbohydrates became more digestible, proteins were coagulated, fats remained unchanged and vitamins A and D both were retained with little or no loss of potency. In canned fruits and vegetables, sterilization tends to cause a loss in vitamin C potency as compared with the fresh fruit or vegetable. Use of copper sulphate for greening vegetables means total loss of vitamin C potency.

An expedient which promises to be a welcome aid to children and convalescents in the matter of taking cod-liver oil is to pack sardines in the oil. When canned in this medium, sardines offer a food which is entirely free from the typical cod-liver-oil taste, yet is high in vitamin A and D potency. The results of the investigation, while in general favorable to sterilization as concerns its effects on quality, serve to point out some actual and potential weak spots which merit the attention of canners.

Digest from "Survey of the Canning Laboratory's Investigations of Nutritive Value and Vitamin Content of Canned Foods," by Gulbrand Lunde, *Tideskrift Hermetikindustri*, 23, 235, 259, 1937. (Published in Norway.)

True Fruit-flavored Syrups by New Evaporation Method

SYRUPS WITH FRESH-FRUIT FLAVOR and good keeping qualities are claimed to result from method disclosed in U.S. Patent No. 2,087,077 granted to Daniel V. Wadsworth and Leonard Wickenden, Manhasset, N. Y.

These syrups are for flavoring ice cream, jellies, soda fountain drinks and the like and are made without the use of boiling or freezing temperatures. Jams and preserves may be made as well as the syrups.

Essentially, the process consists of raising the solid content of the fresh-fruit juices to at least 50 per cent by the addition of sucrose and invert sugar which are readily soluble and which, in the ratio of 1:1, remain in solution. The solid contents of the juices or syrup are raised to about 75 per cent through the evaporation of moisture at low temperatures.

This evaporation is accomplished by rotating a plurality of disks half-submerged in a vat containing the juices and sugar at below 90 deg. F. and half-exposed to a current of air at 170 deg. F., moving rapidly but not rapidly enough to carry away any of the syrup that is on the rotating disk in film thickness.

The method is cited as applicable to juice of citrus and other fruits, berries, pineapples, melons and other watery liquids containing delicate flavors, vitamins and properties likely to be destroyed by boiling or freezing temperatures.

Reduction in volume of juices may be as much as from 8 to 1 and may proceed for considerable period of time by the addition of fresh juices as water is removed through evaporation.

DAIRY PRODUCTS

Oat Flour in Ice Cream to Prevent Flavor Changes

WHEN OAT FLOUR is added to an ice cream mix, it acts both to prevent the development of oxidized flavors and also as a stabilizer. It is best added at the rate of 0.25 to 0.5 per cent (0.75 per cent may give a slight flavor) by mixing with the dry sugar and sifting in. If 0.5 per cent is used, the gelatin or other stabilizer should be cut down at least 25 per cent, otherwise the viscosity will be too great. It gives firmer body and smoother texture and increases the melting resistance. If the stabilizer is adjusted correctly, the whipping properties and overrun are not appreciably changed. It should prove especially useful with fruit ice creams (strawberry and pineapple), as they are more susceptible to the rapid development of oxidized flavors. The process is patented.

Digest from "Oat Flour as an Antioxidant in Ice Cream," by W. S. Mueller and M. J. Mack, *Ice Cream Trade Journal*, October, 1937.

Oxidized Flavor in Milk

A SIMPLE WAY to determine how sensitive are milk and cream to oxidized flavor is to pasteurize them in a glass flask containing a coil of brightly polished copper wire of standard length and diameter, then cool and finally taste after 24 or 48 hours. Using this method, it was found that, as the fat content of the samples increased, so did the speed of development and the intensity of the oxidized flavor. Noteworthy is the fact that when milk is separated and then the skim and cream recombined, this reconstituted milk is less sensitive to oxidized flavor than the original milk. This may be due to the removal of lecithin and like material by separation, as their amount is decreased by separation.

Digest from "The Effect of Fat Content on Oxidized Flavor in Milk and Cream," by Roland and Trebler, *Journal of Dairy Service*, 20, 345, 1937.

Oat Flour and Butter Flavor

ADDING OAT FLOUR directly to butter, or to cream before churning, aids in preventing the development of off-flavors due to oxidation. But the method is objectionable since in the former case the butter is mottled, and in both cases the butter shows sediment and gives a positive starch test.

If the oat flour is extracted with water (about a 5 per cent infusion) at 135-140 deg. F., the clear extract obtained on standing for four to five hours, when added to cream, gave butter which scored higher on storage than samples from the same but untreated cream. It was necessary to use between 1 and 1½ per cent of the extract, based on the weight of fat churned. Storage was at refrigerator temperatures (40-45 deg. F.). Both sweet and sour cream were used. No tallowy flavor developed in any samples, but the butter from the treated cream scored from ½ to 2 points higher on storage from two to eight weeks.

Digest from "Delaying the Oxidative Changes in Butter," by C. D. Dahle and D. V. Josephson, Pennsylvania Agricultural Experiment Station Paper No. [illegible]

Calculating the Overrun

WITHIN CERTAIN LIMITS the overrun and the temperature of the ice cream mix can be [illegible]tically. There is, of course, a maximum overrun, and mixes will stand only so much whipping before becoming unstable. But with these qualifications the mathematically minded can draw a straight-line graph of the equation: Per Cent Overrun $= A_t + B$, where t is the temperature of the mix and A and B are constants for any particular mix. A indicates the rate at which overrun increases with rising temperature while B locates the line with respect to the coordinates. This equation holds good for mixes of widely varied composition, gelatin content, homogenization pressures, and also for different types of freezers.

By applying it, the ice cream maker can express accurately the whipping capacities of various mixes and study the differences brought about by varying various factors. He should be able to determine how to obtain the desired

overrun in the shortest possible time.

Digest from "The Relationship between Temperature and Overrun in the Whipping of Ice Cream Mixes," by Alan Leighton and Abraham Leviton, *Journal of Dairy Science*, 20, 371, 1937.

Dry vs. Brine Salting of Brick Cheese

NO UNIFORM PRACTICE IS FOLLOWED by factories in salting brick cheese. Yet the actual method used is important in controlling quality. Dry salting is effective but the salt is taken up slowly and irregularly. When salting by brines, the strength should be at least 22 per cent to avoid bacterial growth. A 26-per cent brine (which would be saturated) would be simplest but gives an undesirably hard, curdy body, an unnaturally white color, slow ripening and loss of yield owing to low moisture content. Surface penetration of the salt is rapid, reaching a maximum in about 48 hours, while eight weeks curing is necessary to get the salt uniformly distributed throughout the cheese. Salting too early checks acid development which may be needed to control abnormal fermentations. Salting should be done not less than eight hours after dipping and preferably 20 hours. A final salt content of about 2 per cent gives good results.

Digest from "Observations on the Salting of Brick Cheese," by Byers and Price, *Journal of Dairy Science*, 20, 307, 1937.

MEATS AND FISH

Improvement in Fish Curing—Avoiding Proble[illegible] activated [illegible]

"HERRING cured with much less salt than is now employed keep well for six months at –3 deg. C., a temperature usual in [illegible] salt-cured herring. [illegible]table, if a fatty fish is [illegible] not develop the full flavor to whi[illegible]he trade is at present accustomed. A certain degree of preliminary ripening at ordinary temperature before the fish is put into cold storage has been found to improve the flavor, and to bring it nearer to the normal."

Experimental evidence indicates that the rancidity that develops in herring's fat during cold storage is due to certain substances called enzymes. These are activated by common salt, and this explains the rapidity with which herring that have been initially frozen in cold brine develop a rancid flavor during storage, particularly if left unglazed. Delay prior to storage has been found to be detrimental; a stale flavor, rather than one of rancidity, develops in such cases after a few months' storage. It was found, however, that if quite fresh herring were brine-frozen and subsequently well washed, they showed only a slight indication of oxidation of the fat after six months' storage in boxes at –28 deg. C.

Smoke-cured fish (e.g., kippers, finnans, fillets of white fish) are usually kept for some months in cold store at temperatures ranging from –8 deg. to –14 deg. C. with a view to export. Tests at –20 deg. and –28 deg. C. have shown that the quality of the fish is improved by lowering the temperature. This improvement is the result of retarding deterioration, e.g., superficial drying, rancidity, development of cold-storage odor and flavor, loss of smoky odor and flavor and colloidal breakdown of the flesh.

Digest from Report of the Food Investigation Board for the year 1936. (Published in England.)

OIL AND FAT

Hardening Oils

FROM EXPERIMENTS carried out at the Soviet oil hardening plant in Moscow, it appears that the best treatment for freeing raw oils from phosphatides and proteins before hydrogenation is by hydration. This consists in warming the oil to 50-55 deg. C. (122-131 deg. F.) and stirring into it 1.25 to 1.5 per cent of hot (nearly boiling) water. Settling of the slimes requires 60 to 90 minutes, but free acids can be removed by immediate neutralization with alkali. Settled slimes can be utilized by addition to soap stock. In the case of sunflower-seed oil about 20 per cent excess alkali over the calculated quantity is used for neutralization, with the oil at 55-60 deg. C. (131-140 deg. F.). For hydrogenating the deslimed oil, a specially prepared nickel catalyst is used. The hydrogen, which circulates through the converters, is scrubbed with water in scrubbing towers separate from the converters. The preferred method for preparing the catalyst is the electrolytic process developed by Syrkin, utilizing nickel electrodes in a 10-per cent sulphuric acid electrolyte at 60-80 volts a.c.

Digest from "Experiments in the Moscow Oil Hardening Plant," by G. Syrkin and I. Tovbin, *Masloboino Zhirovoe Delo* 13, No. 1, 21, 1937. (Published in Russia.)

How Bacteria Act in Fat Deterioration

RANCIDITY AND FAT CLEAVAGE are ordinarily thought to be caused only by chemical and physical agencies such as oxygen, light, routine catalysts (copper, iron, manganese, vanadium, chromium, nickel), Roentgen rays, electromagnetic rays, and moisture. These ideas, however, should be enlarged to include enzyme action which in a great many cases arises from bacterial contamination.

Bacon fat stored at 0 deg. F. may become rancid in from four months to a year, the original number and kind of bacteria present on the fat appearing to determine this result. This appears to be true even though the bacterial cells will be "resting" at 0 deg. F. But their enzymatic actions (hydrolytic and oxidative) are *not nullified* by the zero temperature.

Furthermore, it is well known that moisture in excess of 0.35 per cent renders many fats subject to spoilage, and microbiological spoilage is not the least among the factors for rancidification under these conditions.

Fat soluble pigments from various micro-organisms cause "pink" fats and purple "stamping ink" discoloration by oxidation-reduction mechanisms that were once thought to be the result of labor sabotage.

An excellent discussion of the chemical changes occurring in fats is presented. These cover the formation of ketone rancidity and flavor reversion, and the minor constituents of fats which have an important bearing on their off-flavors.

Digest from "Action of Micro-organisms on Fats," by L. B. Jensen and B. P. Grettie, of Swift & Co. *Food Research*, 2, 97, 1937.

Getting Out All the Oil

By using the counter-current extraction principle similar to the method which the beet sugar industry employs for building up the strength of sugar solutions in beet diffusers, vitamin-A potencies up to 40,000 International Units were obtained from fish livers. Procedure: digest and peptize the livers, then centrifuge and remove the free oil. Next, mix the wash liquors with cod-liver oil (and oil of low potency) or some other edible oil. Use ½ as much as the amount of oil previously recovered. Then centrifuge, separate the oil, and then repeat the process. Keep on extracting in this way with decreasing amounts of oil until no more vitamin A is picked up.

Digest from "Methods for the Production of Oils from Fish Livers of Low Oil Content," by Broekelsby and Green. Progress Report No. 33, Pacific Fisheries Biological Station. Prince Rupert, B. C., p. 7, 1937.

Better Catalysts for Hydrogenating Sardine Oil

REDUCED NICKEL CATALYSTS are commonly used for hardening fatty oils by hydrogenation, but their catalytic activity is not always of the highest. Some experiments in the hydrogenation of sardine oil have showed that a more active catalyst can be made by precipitating together the carbonates of copper, nickel and cobalt in

(*Turn to page* 738)

The PLANT NOTEBOOK

Electric Steam Generators for Cookers and Kettles

There are many cases and places in which the peak load on a steam plant can be lightened through the use of a moderate amount of electricity in various ways. For instance, where steam is used to drive engines or turbines, and through them an electric generator, the amount of electricity used will in a large measure govern the amount of steam that must be produced to make it. Obviously, if and when the peak demand slightly exceeds what can be handled by the steam plant, the purchase of a moderate amount of electricity will lighten the demand for steam.

It is even possible to entirely reverse the process in certain cases where it may be considered advisable, rather than making a larger investment in steam generation facilities and equipment. That is, electric steam generators can be used and are used for a great many applications, among which are included candy kettles, steam cookers and allied equipment.

There comes a time in the plant enjoying consistent and moderate growth when the existing steam plant will not quite carry the required load, yet will so nearly do so that one might raise a question as to the advisability of immediate installation of equipment for greater steam capacity. The electric steam generator may well be considered as a means of bridging the gap at least temporarily, and in some cases it may pay to use it permanently at more or less isolated points.—JOHN E. HYLER, *Peoria, Ill.*

Welding Repairs Sprocket

The teeth on a milk-case conveyor sprocket wore down until the chain slipped.

We first tried building up new teeth of brass, using an acetylene torch for melting the metal. With this repair, the sprockets gave about two-thirds the service of new equipment.

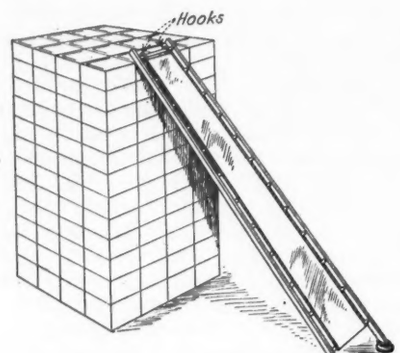
Repairing conveyor sprocket by welding in new teeth.

On the occasion of the next repair, we used 5/16-in. square key steel to make the new tooth points, and backed it up with brass. This repair is expected to last as long as would new sprockets.

We figure that there is considerable saving in making repairs in this way. New sprockets cost $12, plus handling charges. The repair took four hours, and cost about $6, for each sprocket.—CARL RICHARDS, *Chicago, Ill.*

Chute for Handling Cases

The shipping department of a large food distributor handles many orders involving only a few items. In one of their warehouses, devoted to canned goods, filling these orders often necessitated moving a heavy portable elevator all over the building.



This simple portable chute makes easy the job of lowering cases.

To simplify lowering small lots from the top of high piles, a light portable chute was designed which has proved to be very satisfactory. As shown in the sketch, this chute consists of a ladder with rubber anti-skid feet, and a detachable board with hooks arranged to catch the top rung.

After placing the ladder against the pile, one man climbs to the top while another hooks the board in place and stands by to break the momentum of and remove the cases as they slide down.—S. H. COLEMAN, *Roanoke, Va.*

Making the Most of Stack Capacity

Plants which for one reason or another have had trouble with insufficient draft for their boilers, caused by insufficient stack capacity, have often found the difficulty hard to overcome. In many cases there are good reasons for avoiding the installation of a larger stack or of an additional stack, even if that were possible.

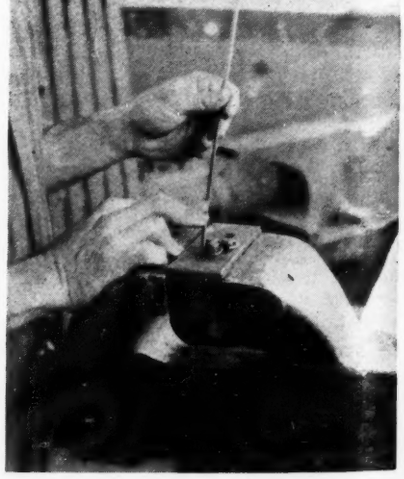
Through the installation of a suitable draft fan, it is very often possible to solve such problems, but a fan should in no case be installed unless the advice of fan specialists has been sought in the matter. If and when such specialists have definitely advised the installation of a fan, they are usually prepared to guarantee that certain results will be obtained through its use.

Another thing that is well worthy of consideration in any problem dealing with insufficient stack capacity, where coal is used for fuel, is the fact that fuel oil can be burned for a given boiler capacity with only an approximate 60 per cent of the stack area needed when coal is burned. It is possible in some cases, as a result of this, to change from coal to oil burning where stack capacity has been insufficient, and have really more stack capacity than is needed. Every plant is, of course, something of a law unto itself, so that problems of this type should be considered in the light of expert advice before making any definite moves.—JOHN E. HYLER, *Peoria, Ill.*

Hooks for Signs

Hundreds of hooks are used annually in placing advertising signs. These hooks are 9/64x5/32-in. Bessemer steel, and are made in the following manner:

Three pins of 7/16-in. diameter steel are set into a strip of ½x2-in. soft steel. This, when fastened in a vise, as shown



How S hooks for signs are made.

in the photograph (page 724), is our jig.

In operation, the end of a rod of the hook material is inserted between two of the pins and bent into a circle. It is then turned over on one pin and bent between the other two. This completes the figure 8.

The operation is then repeated on the other end of the rod; both hooks are cut off, and then two more hooks can be made.—AL SUTTON, *Kansas City, Mo.*

Cutting Pump Rings

Some years ago we found it impossible to purchase felt packings for the universals, pinions and axle shafts of our automotive equipment. So we purchased felt sheeting and cut the packings ourselves. For this we used a ring cutter consisting of two blades, a center with set lock, and a carpenter's brace.

Cutting rings for milk pump from rubber sheeting.

Today we find this same cutter useful in making rubber gaskets for some of our sanitary fittings and for the milk pump. These gaskets are cut from sheet rubber. The photograph shows the cutter in use for this purpose.—AL SUTTON, *Kansas City, Mo.*

Using Synthetic Rubber In Food Equipment

One design of machine for extracting the juice from oranges makes use of a flexible cup to hold the fruit. This is done because the oranges are not all of the same size, and some form of flexible device is needed to hold all of the various sizes firmly.

In the earlier design of this device, rubber was used to form this cup. However, rubber was not satisfactory, because the oil from the orange skins and the citric acid from the juice both attacked it.

This difficulty has been solved by making the cups out of synthetic rubber of the "chloroprene" type. This substance has the flexibility of rubber, so that it will serve its purpose with the varying sizes of oranges and, at the same time, its composition is such that it is not affected by fruit oils or fruit acids.—A. E. CLARK, *Wilmington, Del.*

Cup for oranges, made from "chloroprene" synthetic rubber

Selecting Elevators

Food plant freight elevators must be chosen so that they are safe and so that they may operate with minimum power consumption. No elevator should ever be installed unless tested by its manufacturer and these results guaranteed by that manufacturer.

The cost of a freight elevator should be computed over its entire life, not merely at the initial price. It must be large enough to fit the duties required. Parts should be standard and interchangeable.

Most cities supply only alternating current as the power for elevators. Smaller elevator service is satisfactory with alternating current up to 150 ft. per minute using single speed motors, and with two-speed motors up to 250 ft. per minute. Direct current from individual motor-generator sets is necessary for elevators of 300 ft. per minute or more. High-speed generators should be avoided.

An elevator having a capacity of 1,000 lb. should have a speed of about 50 ft. per minute, one of 1,500 lb. about 35 ft. per minute and one of 2,000 lb., 25 ft. per minute.

Controllers should be of the flexible hand cable type and be automatic after being put into service by the operator. Double safety catches located underneath the platform should be operated by an overhead speed governor so that they will grip the heavy timber posts and hold the car securely. An automatic safety hand brake of sufficient diameter to hold the car securely at the landing when loading and unloading is advisable.

The best car platforms are constructed of selected straight grain kiln dried lumber. The sling should have reinforced side stiles and double crossheads to give maximum strength. The platform should be assembled of heavy side beams with joists mortised and reinforced with joist hangers. The best elevators have each joist trussed with iron truss rods. Fir makes a good flooring.

Cast-iron sections securely bolted together are generally used as the counter balance.

Bunches on cables should be babbitted to the cables. Generally steel friction cable is specified. The main car and counterweight guide posts should be heavy timbers compounded to give additional strength by means of bolts; they should not be nailed together.—E. W. FAIR, *Oklahoma City, Okla.*

Thread Chaser Helps

We have found that a square thread chaser, originally made for automotive maintenance work, is a very useful tool in this milk and ice cream plant. One of its most important uses is in straightening battered sanitary line fitting threads. We find many other cases when it is useful in fixing threads that are slightly smashed. And, of course, it is also useful for its original purpose, as shown in the photograph, where it is being used for dressing pack nut threads on a truck drive slip-joint.—BILLIE BURGAN, *San Diego, Calif.*

Square thread chaser in use.

Pumps with Speed Transmissions

In handling products by means of pumps, when the product should not be subjected to unnecessary agitation, use of a speed transmission between motor and pump will help in many cases. It is, of course, evident that the same thing could be accomplished by means of a variable-speed transmission or through the use of a variable-speed motor. Where given speeds have been found best for containers of given sizes, however, there is the advantage to the speed transmission of sliding-gear type that a given speed is automatically produced when the transmission is in a given place, provided the speed of the motor is constant.—JOHN E. HYLER, *Peoria, Ill.*

Food Equipment News

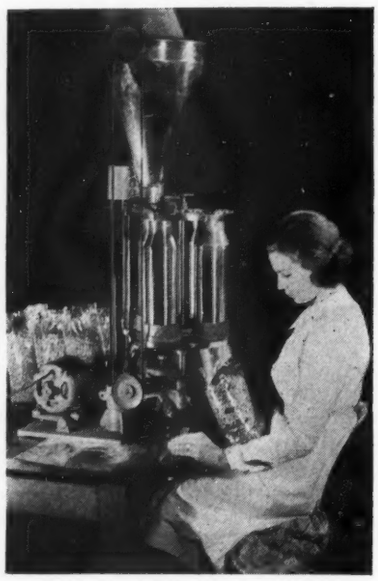
REVIEW OF FOOD PROCESSING EQUIPMENT, ACCESSORIES, AND SUPPLIES

"Whiz-Packer" Improved

LARGER AS WELL AS SMALLER CONTAINERS can now be handled at high speed on the redesigned "Whiz-Packer" filling machine made by Frazier & Son, Belleville, N. J. New quick-change equipment has doubled the discharge formerly obtained and gives this machine a package-size range said to be equal to that of two ordinary machines of graduated size.

Whiz-Packers now come in two sizes. The small size (shown in the illustration) has a range from 1/2000 cu.in. to 53 cu.in. The larger machine has a range from 28 to 95 cu.in. Adjustment for size is said to be quickly made.

The picture shows a spout for bags. Spouts can be furnished to suit any other type of container. Seven speeds, from 12 to 72 per minute, are available.



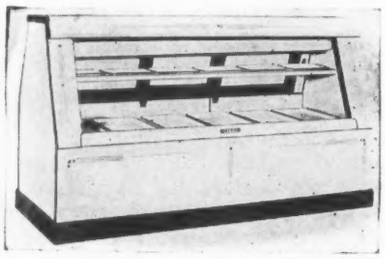
Filling bags with a "Whiz-Packer."

Refrigerated Cases

DESIGNED for use by groceries, meat markets and other food stores, refrigerated display cases are now being manufactured by Norge Division, Borg-Warner Corporation. The cases are 7 ft. long. Exterior is of white porcelain enameled iron with black trim. Hardware is chromium plated brass. The display glass section is of triple, $\frac{1}{4}$ in. plate glass, rubber sealed to prevent fogging. Service doors are of molded hard rubber, sliding on hard rubber tracks and equipped with three plates of $\frac{1}{4}$ in. plate glass.

Interiors are also of white porcelain enameled iron, except the bottom of storage compartment, which is of special acid resisting vitreous porcelain. Display platters are $\frac{3}{4}$ in. deep, white porcelain with blue-black edges. The top self holds six $8\frac{1}{2}$x12 in. platters, bottom shelf, six $12x23\frac{1}{2}$ in. platters.

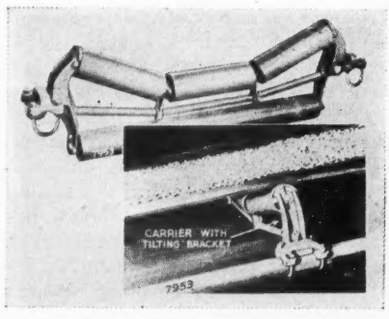
Refrigeration is supplied by 1/3 hp. condensing unit mounted inside the lower portion of the cabinet, through two coils. One coil is in the display section, the other in the storage section, which is of 12.9 cu.ft. gross capacity.



Refrigerated display case.

Belt-conveyor Carrier

STEPHENS-ADAMSON MFG. CO., Aurora, Ill., has developed a light-weight, ball-bearing belt-conveyor carrier. As shown in the accompanying cut, the light, rigid, truss-type frame is supported on two parallel pipes instead of upon the conventional structural-steel or bulky timber structure. Carrier brackets are clamped to the pipes without boring holes, and carriers can be shifted whenever necessary. By using standard piping, a light, sturdy conveyor frame can be quickly and inexpensively assembled from materials obtainable anywhere.



Light-weight conveyor carrier clamps on pipe frame.

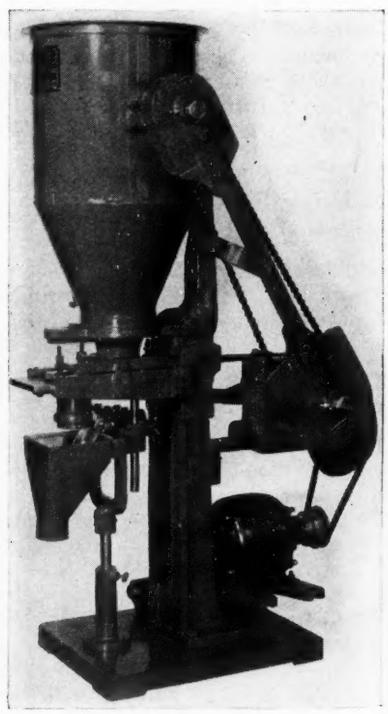
All-purpose Filler

A NEW ALL-PURPOSE VOLUMETRIC FILLER is being manufactured by Triangle Package Machinery Co., 906 No. Spaulding Ave., Chicago, Ill.

The new machine has a range from $\frac{1}{4}$ oz. to 24 oz. per discharge, with easy flexibility and quick adjustment. There is only one, fully adjustable measuring cup.

The machine is equipped with an agitator to feed powdered materials. Mechanical scrapers prevent the escape or accumulation of material on the measuring plate.

It is claimed that this machine will



All-purpose filler.

handle all powders and granular materials packaged in food plants.

Fibrous Glass Insulation

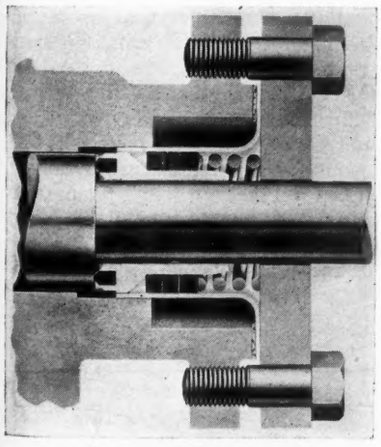
INSULATING BLANKETS of fibrous glass for refrigerated truck bodies are sold by Armstrong Cork Products Co., Lancaster, Pa. The product consists of stitched blankets of Armstrong-Corning wool, made by Corning Glass Works, Corning, N. Y. Thicknesses from $\frac{3}{4}$ in. to 5 in. are available in sizes up to 9x50 ft., or longer if required. The blankets may be faced on one or both sides with any specified materials. In addition to blankets, bats, rolls and other forms are available.

Processing Tank

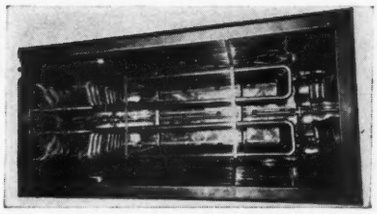
COOKING, COOLING, MIXING AND STORAGE can all be carried out in a machine recently put on the market by John Werner & Sons, Inc., 713 Lake Ave., Rochester, N. Y., for confectionery manufacture and similar purposes, such as making syrups, soups, flavors, preserves and ice cream mixes.

As can be seen from one of the accompanying photographs, the interior is equipped with two coils. Depending upon the medium circulated, these will either heat or cool the contents of the tank.

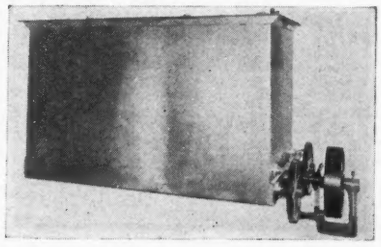
There are three agitators, lying parallel to the coils, at bottom of tank.



Seal for rotating shafts.



Interior of processing tank, showing coils.



Exterior of processing tank.

This machine can be had in direct-motor or pulley drive. It comes in stainless steel, Monel metal or Everdur. The tank is of welded construction.

Rotating-shaft Seal

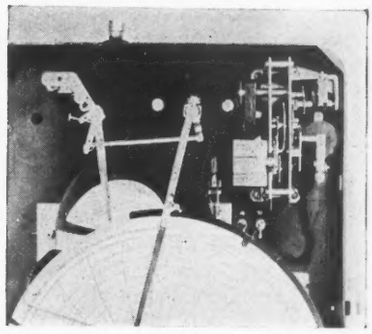
SYNTRON CO., HOMER CITY, PA., is making a shaft seal for the elimination of leakage of gas or liquids from compressors or pumps. In this seal, the main sealing surface consists of an anti-friction, self-lubricating compound insert in bearing metal. The sealing head of bearing metal with this insert is held firmly against the shoulder on the rotating shaft by spring pressure which also expands the packing rings, thus sealing the bearing head to the housing.

This seal is said to be effective on worn and scored shafts as well as on new shafts. Advantages claimed include: elimination of leakage over a long period of operation without adjustment; self-seating action; self lubrication; and self centering.

Flow-meter Integrator

BRISTOL CO., Waterbury, Conn., has developed an electric integrator for flow meters which totalizes flow once every fifteen seconds.

Referring to the accompanying photograph, a flat disk cam is seen, partially concealed by the chart plate of the instrument. This cam mechanically computes the square root of the differential pressure across an orifice-plate or venturi-tube constriction in a pipe line, at 15-sec. intervals. The values obtained are totalized by means of a counter and are indicated on a six-figure indicator dial.



Flow-meter integrator.

In the photograph, the integrating mechanism is shown to the upper right of the cam.

First-aid Kit

DAVIS EMERGENCY EQUIPMENT CO., Inc., 420 Lexington Ave., New York, N. Y., has developed "Brac-Kit," a first aid kit especially for industrial plant use. This kit has a container which locks firmly, with a dust-proof and water-proof seal and which fits in a case that can be permanently mounted in any convenient location. The kit holds ten unit cartons containing dressings and treatments.

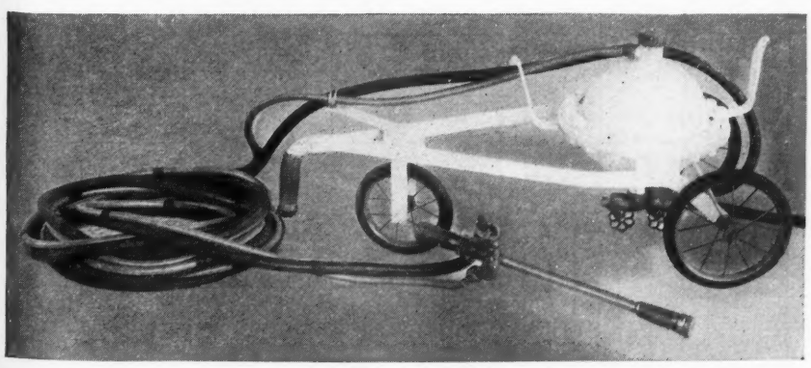
Spoilage-control System

A SPRAYER and a solution for mold, yeast, bacteria and odor control in food plants and food handling equipment have been developed by Cascade Sprayer Co., Inc., 2709 First Ave., South, Seattle, Wash.

Sprayers are available in three models: Model 4, with 24-oz. concentrate capacity; Model 52, with 2-qt. concentrate capacity; and Model 58 with 2-gal. concentrate capacity. These sprayers eliminate premixing, as they carry out mixing, dilution and spraying all as one operation. Dilution is adjustable so that the strength of the solution may be varied from 100 parts per million of chlorine to over 4,000 p.p.m.

These sprayers work under water pressures from 25 to 150 lb. They are constructed of suitable materials to withstand the corrosive action of chlorine disinfectants and the erosive action of the spray.

For use with these sprayers, the same company has developed "Casklor," a stabilized sodium hypochlorite solution.



Sprayer for sodium hypochlorite solution.

BUSINESS TRENDS

Commodity Prices Level Out

THOUGH MUCH LESS PRECIPITATE than in the preceding four-week period, prices of most food raw materials continued their downward trend in the month ending Nov. 15, with an evident tendency to level off toward the end of that time. Some observers are inclined to attribute this leveling off to the assembling of Congress in special session, while others, with perhaps more reason, consider that most of the inventories that troubled some manufacturers have in good part been worked off.

As an indication of this commodity-price situation, Professor Irving Fisher's index number was 87.1 in mid-November, having been 87.9 the week before, 88.1 two weeks before and 89.5 four weeks before.

Coffee Out of Control

NEXT IN IMPORTANCE to the general leveling off of commodity prices, and much more spectacular, have been the gyrations of coffee prices during the past month.

The Brazilian government, having achieved one of those largely bloodless revolutions, so common in South America and so incomprehensible to North Americans, proceeded, about Nov. 1, to make some changes. This time there was something more than the usual nepotic and political shifting in office—the coffee export tax was cut and the export coffee market was thrown open to so-called "open competition."

Of course, the price of coffee dropped. In fact, it went to record lows. The March Santos contract touched 6.42 cents on Nov. 12, eight points below the preceding record low of the week before and comparing to a price of 9.12 cents on Nov. 1.

What the result of this sudden slide-off in coffee prices will be cannot, of course, be seen so soon. Trade has been brisk since Nov. 1, and apparently one of the first results is that Brazil will pick up some of the coffee trade that has been lost in recent months.

Another result of the price change is to increase the differential between Brazilian coffee and the higher priced coffee of Columbia, Mexico, East Africa and other countries. This increased differential may also favorably affect Brazilian coffee volume.

In any case, the American food industry should benefit from an assured and ample supply of good coffee at a low price.

Construction News

	Pending (thousands)	Awarded November (thousands)	Total Awarded 1937 (thousands)
Bakery	$40	$213	$1,662
Beverages	688	205	8,696
Canning and Preserving	120	40	1,624
Confectionery	.....	.....	40
Grain Mill Products	50	50	835
Ice Manufactured	75	.....	3,526
Meats and Meat Products	65	80	1,560
Milk Products	140	305	5,533
Miscellaneous	335	250	10,739
	$1,513	$1,143	$34,215

Wheat in 1938

THREE ESTIMATES of current acreage planted to winter wheat range from 54,152,000 to 57,762,000 acres. Last winter the acreage seeded was 57,187,000. Exactly what this might mean in the way of a crop will depend upon rain, sun and frost, but some idea, assuming average conditions, can be obtained. Early spring rains will determine the crop size.

What might be called normal abandonment for winter wheat is 12.4 per cent. That would leave the acreage to be harvested at 49,100,000 acres, in round numbers. The 1920–29 average yield of winter wheat is 14.7 bu. per acre. Consequently, at the present time a crop of about 722,000,000 bu. is indicated.

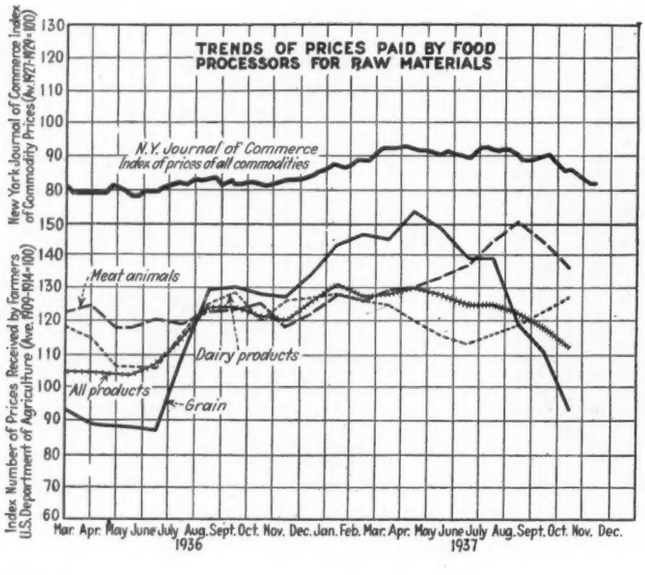
If a normal spring wheat crop of 225,000,000 bu. were added to this, it is apparent that a prospective 1938 wheat crop of 950,000,000 bu. is in view. This estimate is probably much too high—certainly so if ample rains do not fall.

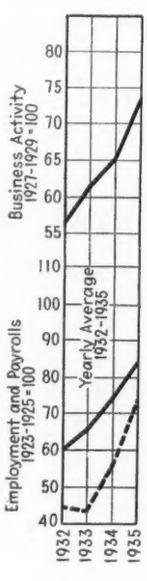
More Cottonseed Oil

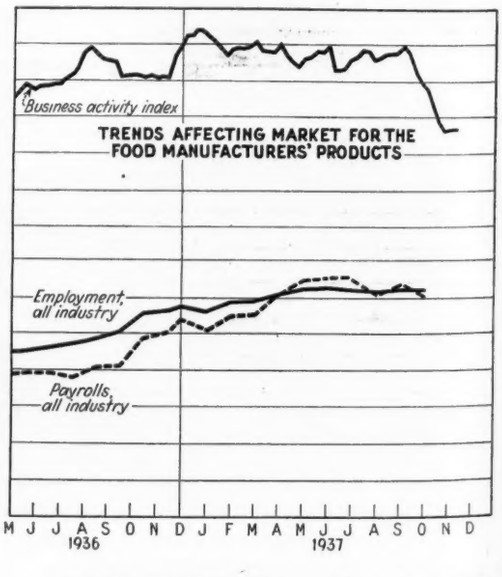
PROSPECTS for a record cottonseed-oil yield were boosted again, early in November, when the Government revised upward its reported total of the cotton crop. Standing at 18,243,000 bales, this crop now exceeds even that of 1926, the previous record year.

About the same time, the report for October consumption of cottonseed oil was released. This figure, a total of 484,633 bbl., was another all-time record, exceeding September 1937, by 90,000 bbl. and October, 1936, by 262,000 bbl.

Reasons for this high consumption of cottonseed oil are in part temporary, stemming from the relatively small and high priced supply of lard, and the lack of cheap and abundant ocean trans-


TRENDS OF PRICES PAID BY FOOD PROCESSORS FOR RAW MATERIALS
New York Journal of Commerce Index (Av. 1927-1929=100)
Index Number of Prices Received by Farmers, U.S. Department of Agriculture (Ave. 1909-1914=100)
N.Y. Journal of Commerce Index of prices of all commodities
Meat animals
Dairy products
All products
Grain
Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec. Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
1936
1937




Business activity index
TRENDS AFFECTING MARKET FOR THE FOOD MANUFACTURERS' PRODUCTS
Employment, all industry
Payrolls, all industry
Index Number Aug. 1909-July 1914=100
M J J A S O N D J F M A M J J A S O N D
1936
1937

Business Hunts Bottom

While the decline in business which was so evident from Sept. 15 to Oct. 15 continued during the succeeding four weeks, its pace was much slower. As reported last month, the *Business Week* index of business activity dropped 9.21 per cent in the four-week period up to mid-October. In the period ending Nov. 7, this index fell only 4.61 per cent.

General conditions show some improvement, at least not being nearly so bad as had been expected in the more pessimistic quarters. Auto production lags behind best expectations, but is about at last year's level. Construction shows considerable improvement. Steel is off until inventories drop. Food business is good, except in meats. Retail sales are up for chain stores and mail-order houses, but down for department stores.

Wholesale prices of all commodities, as shown by the Department of Labor index, fell 2.79 per cent from Oct. 9 to Nov. 6, while farm prices fell 6.04 per cent and wholesale food prices fell 2.99 per cent in the same period. The *New York Journal of Commerce* weighted commodity-price indexes also fell during the corresponding four weeks (Oct. 16 to Nov. 13) the general index dropping 4.64 per cent, while the grain index fell 9.23 per cent and the food index 7.11 per cent.

port for coconut and other foreign oils. Also, the continued high price of butterfat permits cottonseed oil to go into oleomargarine in relatively large quantities and at attractive prices. It may be that cottonseed oil can hold all of its present markets when conditions are again more normal, but if it does so, some readjustment of the price structure will likely be necessary.

Candy Sales Up Again

MANUFACTURERS' SALES of confectionery and competitive chocolate products attained higher levels in September, 1937, than for any September since 1929, according to a report of the Bureau of Foreign and Domestic Commerce covering 286 manufacturers. These manufacturers reported sales of $28,237,124, an increase of 7.4 per cent over September, 1936. And for the first nine months of 1937, those same manufacturers report sales 10 per cent above those recorded in the first nine months of 1926.

Meat Prices Off

RECENT FIGURES on per-capita consumption of packing-house products stand at 7.95 lb., compared to 8.36 lb. in September, 1936, and a five-year average for September of 8.10 lb. This figure is an indication of the definite consumer reaction against high meat prices.

Naturally, this condition, has been reflected right back to the prices which farmers receive for meat animals. Hogs were hit hardest, after reaching a high of $13.75 just 3½ months ago. Recently, the prices have dropped to levels well below $9. Cattle lost $2 to $4 per hundred pounds, while lambs dropped more than $3 a hundred.

Meat Outlook for 1938

LARGER MEAT SUPPLIES in 1938, and a somewhat lower demand, is the forecast of the Bureau of Agricultural Economics. These conditions will bring somewhat lower retail prices. The scarcity of high grades will be relieved and pork supplies will be more plentiful.

An upward trend in livestock production is expected to commence next year, but supplies probably will be lower than average for two or three years. Under favorable conditions, the total number of livestock on farms is expected to rise by 1942 or 1943 to a level equal to or in excess of the relatively large numbers of 1933 and 1934. The result would probably be a total meat volume higher than the 1925–29 average. However, by 1943, the population will be considerably higher than in 1929, so that the actual per capita supply will be lower.

More Sugar Consumed

DELIVERIES OF SUGAR in the United States for direct consumption during the first nine months of 1937 are reported by AAA at 5,281,641 short tons. This compares to deliveries of 4,961,519 short tons for the same nine months of 1936. In September, however, deliveries were down somewhat, totaling but 549,649 short tons, compared to 627,441 short tons in September, 1936.

World consumption of sugar has also increased. Lamborn & Co. reports that the fourteen principal European countries consumed 8,123,556 long tons, raw sugar value, during the crop year ending Aug. 31, 1937. This was an increase of 5.1 per cent over consumption in the preceding year.

INDICATORS

SWEET-CORN PACK, total for the United States for 1937, according to revised reports of the National Canners Association, was 23,541,224 standard cases.

ASPARAGUS ACREAGE for cutting in 1938 is now estimated at 113,670 acres, compared to 109,320 acres in 1937.

FISH LANDINGS in New England, first nine months of 1937, declined 8 per cent in quantity and 21 per cent in value, compared with the first nine months of 1936.

FISHERY PRODUCTS in cold storage on Oct. 15 totaled 72,389,000 lb., 16 per cent below last year's figure but 3 per cent above the five-year average.

FISH FROZEN IN OCTOBER amounted to 19,663,000 lb., compared to 18,562,000 lb. for the same month last year.

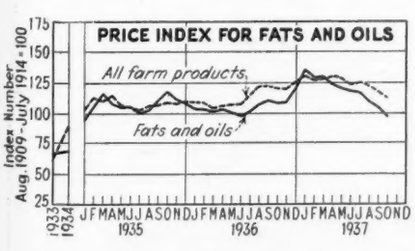
FROZEN FRUITS in cold storage, Nov. 1, 1937, were 129,683,000 lb., compared to 79,272,000 lb. the year before and a 1932-36 average of 76,971,000 lb.

CHEESE IN STORAGE, Nov. 1, 1937, totaled 112,376,000 lb., compared to 118,907,000 lb. on Nov. 1, 1936, and a 1932-36 average of 107,315,000 lb.

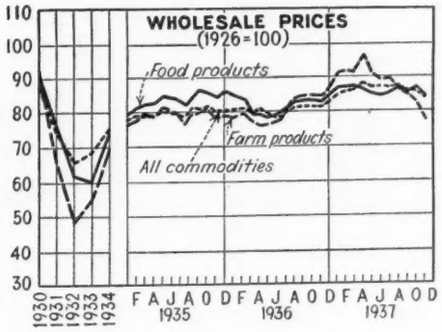
EGGS IN STORAGE, case-equivalent of all varieties, totaled 8,976,000 cases on Nov. 1, 1937. This compared to 6,132,000 cases the year before and a 1932-36 average of 6,667,000 cases.

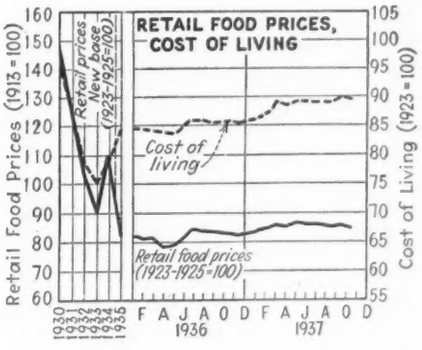
POULTRY IN FROZEN STORAGE, Nov. 1, 1937, was 76,179,000 lb., compared to 104,981,000 lb. a year ago and a 1932-36 average of 69,212,000 lb.

MEAT IN STORAGE, Nov. 1, 1937, all kinds, was 354,411,000 lb. This compares to 543,252,000 lb. in storage on Nov. 1, 1936, and a 1932-36 average of 548,537,000 lb.


PRICE INDEX FOR FATS AND OILS
All farm products
Fats and oils
Index Number Aug. 1909-July 1914 = 100
1933 1934 J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1935 1936 1937

Prices received by farmers are from the U. S. Department of Agriculture. Employment, payrolls, wholesale prices and retail prices from the U. S. Department of Labor. The business activity index is that of *Business Week*. The cost of living index is from the National Industrial Conference Board. The data on fats and oils are from the Bureau of Raw Materials for American Vegetable Oils and Fats Industries.


WHOLESALE PRICES (1926=100)
Food products
Farm products
All commodities
1930 1931 1932 1933 1934 F A J A O D F A J A O D F A J A O D
1935 1936 1937


RETAIL FOOD PRICES, COST OF LIVING
Retail prices New base (1923-1925=100)
Cost of living
Retail food prices (1923-1925=100)
Retail Food Prices (1913=100)
Cost of Living (1923=100)
1930 1931 1932 1933 1934 1935 F A J A O D F A J A O D
1936 1937

Keeping Up WITH THE FIELD

Meat packers hold convention—Milk dealers discuss problems—Bakers consider sales troubles—Bottlers get plant operating advice—Washington views

Meat Packers Meet

WITH REGISTERED ATTENDANCE and number of exhibits approximately 10 per cent greater than last year, this year's convention of Institute of American Meat Packers ranks among the best attended in the history of the meat packing industry.

During the first two days of this meeting, which was held at Chicago, Oct. 22-26, the several sections of the Institute held closed sessions before which were discussed present-day problems in accounting, plant operation, technical research and control, plant engineering and construction, and sales and advertising.

Supplies of livestock for butchering, present and possible future taxes, distribution costs and general economic conditions were dominating subjects of the public sessions of the convention.

C. A. Burmeister, Bureau of Agricultural Economics, predicted an inspected slaughter of 32 to 33 million hogs during the current marketing year, as compared with 34 million for the year just ended. Average yearly weight of each hog will likely run from 230 to 235 lb. as compared with 220 lb. for the past year.

Total slaughter of cattle and calves is expected to be less in 1938 than in 1937, with that of cattle alone as large, probably a little larger, than in 1937. Supply of well finished cattle is expected to increase gradually after the first of 1938 to a much larger supply at the end of 1938 than in 1937.

Also, the supply of fed lambs for the coming marketing season is expected to be larger than that of last year. However, total slaughter of sheep and lambs may be no larger, because marketing of lambs and sheep from sources other than feed lots is expected to be smaller.

A continued increase in livestock numbers is expected for the next five years, barring a return of drought conditions.

Harold G. Moulton, president of Brookings Institution, cited the following as production requirements in the United States: "1. To make good the actual deterioration of plant and equipment sustained during the depression. 2. To increase productive capital in proportion to the growth of population that has occurred. 3. To expand the output of consumption goods in accordance with this growth of population." Over the next five years production in durable goods will have to be 60 per cent greater than in 1936 to put the living standards back on the 1929 level; eight to nine million additional workers will be needed. Since 1929, total population has increased 5 per cent and production capacity has failed to keep pace.

Thos. E. Wilson, president of Wilson & Co., reminded the convention that unavoidable high prices had been largely responsible for the 25 lb. per capita decline in meat consumption, and that the 1937 increase in wages throughout the industry just equaled the 1936 profits.

W. W. Woods, president of the Institute, warned the industry that it had to prepare for an expanding trend that is coming sooner or later.

Whiting Williams, industrial consultant, gave trivial grievances, misunderstandings, fear of being jobless and failure of management to recognize the pride of the worker in his job as being responsible for most labor troubles.

The packers reelected Frank A. Hunter, chairman of the board; W. W. Woods, president; and H. H. Meyer, treasurer.

Milk Dealers Air Problems

MILK SALES are up 3.5 per cent over the same period of 1936. That was a cheerful bit of news dispensed by R. C. Fisher, president, at the convention in Dallas, Oct. 21-23, of International Association of Milk Dealers. But Mr. Fisher believes that the industry can do much better by popularizing milk with adults, *a la* tomato juice.

Another hint on selling was offered by James R. Hudson, Peoria, Ill., who reported that homogenized milk had doubled the sales of a new plant. The qualities of homogenized milk which increase marketability were listed as: (1) improved flavor; (2) heavier body; (3) increased digestibility; (4) improvement which it lends to cooked

Wide World

APPLYING THE BIG SQUEEZE

These dairy farmers, picketing the Dairymen's League plant at Potsdam, N. Y., are part of those who struck for higher prices in nineteen counties of up-State New York last month. When some of the dealers raised prices, consumer organizations in New York City set up a squawk, so the milk distributors got it from both sides, as usual.

dishes; (5) that most doctors are willing to recommend it for infant feeding. Its one disadvantage is absence of a cream line.

Advantages of daylight delivery were pointed out by Edwin S. White, North Quincy, Mass. These include better condition of product, improvement in collections, lower operating costs, greater safety, higher advertising value of men and equipment, less consumer ill will incurred through noise, less stolen milk, fewer errors and a higher type of routemen.

"Milk Machinery of the Future" was the subject of J. H. Forslew, chief engineer, Bowman Dairy Co. Some form of energy other than heat for destroying bacteria may be expected in the future, he said. Light rays are reported to be an effective sterilizer, and it is "more than possible that sterilization and the addition of vitamin D will ultimately be accomplished in the same operation."

The resazurin test is as trustworthy as the methylene blue test in evaluating the sanitary condition of milk, in the opinion of G. A. Ramsdell, Bureau of Dairy Industry. This test may be completed in only one hour and is more effective in detecting very poor milk.

To prevent oxidized flavor: (1) use milk which is normal in composition, especially in respect to carotene content; (2) use milk of low apparent acidity; (3) use corrosion-proof equipment; (4) protect the milk from sunlight during delivery; (5) avoid freezing; (6) shorten the storage period. This was the advice of Dr. W. H. Martin, Kansas State College.

R. C. Fisher, president, and other officers of IAMD were reelected.

Bakers Discuss Sales Problem

HOW TO FOSTER GREATER BREAD CONSUMPTION was the keynote of the convention of American Bakers Association, held in Kansas City, Oct. 24-27.

As a climax to the convention, announcement was made that the Association had expanded the American Institute of Baking to include a department of nutritional education under the direction of Dr. James A. Tobey, formerly with Borden Co.

In his keynote speech, Mayor Bryce B. Smith, vice-president of General Baking Co., urged the Association to adopt a definite program that all bakers could support in a drive for wider markets for their goods.

Speakers outside of the industry discussed the need and value of bread in the human diet and suggested how greater consumption might be obtained through wider public good will, through market researches, better advertising and better public relations.

In the Bakery Sales Association session, Ray K. Stritzinger, vice-president of Continental Baking Co., plead for a correction in pan sizes to cut costs and to improve bread quality, with the elimination of the "jumbo" loaf for the good of increased consumption of bread.

John Roberts, president of American Society of Bakery Engineers, headed up the presentation of what the bakery engineers are doing for the baking industry in product quality, plant operation and accident prevention.

Dr. Tobey emphasized the need of pleading the case for bread with both the professional classes and the general public and suggested how this program might be carried out.

CONVENTIONS

DECEMBER

7—Canners' League of California, Palace Hotel, San Francisco.

15—Northwest Frozen Foods Association, Seattle, Wash.

JANUARY

17-19—New England Association of Ice Cream Manufacturers, Copley Plaza Hotel, Boston.

23-27—National Canners' Association, Hotel Stevens, Chicago.

23-27—National Food Brokers' Association, Palmer House, Chicago.

23—National Preservers' Association, Chicago.

24-28—Fifth International Heating and Ventilating Exposition, Grand Central Palace, New York.

25-27—American Society of Refrigerating Engineers, Hotel Roosevelt, New York.

ABCB Gives Pointers

PRACTICAL POINTERS on plant operation were given out in copious quantities at the convention of American Bottlers of Carbonated Beverages, held in New Orleans, Nov. 15-19.

To minimize damage from flood, the bottlers were advised by C. R. Arnold, Iowa State College, to: (1) move filled stock to strategic points from which it can be delivered during interruption of plant operations; (2) move motors, valuable machine parts, raw materials, labels, etc., to an elevated place; (3) fill empty tanks and pipe lines with clean water to prevent their floating.

Some bottling-plant-operation defects and their remedies were pointed out by Max Levine, Iowa State College. He emphasized the need for more accurately gaging the CO_2 pressure in bottled beverages, showing that there were variations of 200 to 400 per cent in the amount of gas in different bottles in some plants. He also urged proper water treatment to avoid variation in beverage taste.

Adequate lighting for the bottling plant was described by A. K. Gaetjens, General Electric Co. He recommended these light intensities: 10 foot-candles of general lighting in the bottling room, with 100 fc. additional at the feed and clean-bottle ends of the soaker and 40 fc. additional at the syruper, filter, mixer, labeler and siphon filler; 5 fc. for storage areas and 20 fc. for active working areas in shipping and receiving rooms; 20 fc. in the syrup room and also in the offices.

If you are to have a smooth crowning operation, you must handle crowns in a manner that will not permit them to become distorted. That was the suggestion of J. M. McCormick, Armstrong Cork Products Co.

"The most difficult thing that the soft-drink industry has to learn about advertising is that it must tell people what people want to know about the business, rather than what the industry thinks the people ought to know," said William G. Hills, ABCB industry relations director.

Mid-November

CAPITAL VIEWS

PROCESSING TAXES—Agricultural control is wanted by the President and his departmental advisers, even though it costs a lot of money. The executive departments have decided that the bill should be paid by levying processing taxes, with cotton, wheat and rice as the logical commodities to bear such levies. Congressmen do not like this prospect, and early decisions against it make the whole matter very uncertain at mid-November, just as Congress convenes. No one can know what the final outcome will be until many weeks hence, when agricultural legislation takes on its final form and reaches the White House.

TRICK SELLING—Few respectable food manufactures doing business nationally stoop to lottery methods or other counter "tricks" in the sale of their goods. But there are just enough confectioners and novelty-goods makers who do this to give a bad flavor to the whole food group at Federal Trade Commission. One unofficial suggestion noted in Washington is that manufacturers step down hard on any of their customers whom they find using these stunts as a part of their retailing practice. This would undoubtedly improve their standing when more important

merchandising matters arise, Robinson-Patman cases, for example.

FOOD LAW—Washington still expects the Copeland food bill to be enacted this winter. Certainly this hardy perennial ought to blossom soon.

CHEAP FATS—The burden of surpluses of cottonseed oil is heavy on the whole food market. Purchase of some of the surplus by the Government for distribution through relief channels is not nearly enough to bring about the stabilization sought by various agricultural groups, notably the dairy industry. Low-cost fats are expected to be one of the most persuasive arguments of those backing further agricultural control measures, especially the compulsory crop-curtailment plans. A cotton-corn-dairy alliance is almost irresistible in Congressional circles.

PLANNING—The use of zoning regulations on a national scale is now proposed as one of the bases for compelling the proper use of land. Thus Secretary Ickes would extend the scope of his National Resources Committee so that it would, with regional, state and local planning boards, become the monitor of farmers. A recognition of this trend is likely to discourage, rather than advance, the plans for the seven regional planning boards, which the Administration seeks to establish—"Seven Little TVA's," as they are commonly called in Washington.

NEW CHAIN ALLY—Farm cooperatives are finding chain merchandisers the best aids for selling otherwise surplus perishable crops. As a result, the leaders of organized agriculture in Washington rush to the aid of the chain stores whenever these merchants are threatened by further Federal restrictions. This is a new trend in food distribution which Washington believes will be very potent in Congress, and in determining other food business policies, too.

WARD'S SOFT BUN BREAD

Speeds Production!

Cuts Costs!

any way you

SLICE IT...

Mother Goose methods may still get by in the pipe-organ industry or the building of yachts. But only Class A production engineering can keep consumer prices down to the chin-level of the daily-bread market . . . and leave a morsel or two for the stock holders. A plant that was modern last year belongs with Noah's Ark and that sunset on lake Coma . . . if today's competitor does the job better.

But a program of perpetual modernizing may not be such a headache after all. Take Ward Baking as a shining example. By modernizing half a dozen bread baking plants oven by oven, they keep production close to the ultimate.

And Ward assures us that modernizing with Kemp indirect-firing (possible only with the patented Kemp process of 100 per cent pre-mixing of gas and air) has stepped up production, and, *as a plus value,* scaled down fuel cost.

If you are interested in this sort of thing, Kemp engineers can tell you in advance exactly the savings you can expect. Perhaps you'd better ask your secretary to get the facts. Have her address **The C. M. Kemp Mfg. Co., 405 E. Oliver St., Baltimore, Md.**

KEMP of BALTIMORE

CONCENTRATES

• There is no adequate provision for seasonal industries in the Black-Connery wages-and-hours bill, in the opinion of International Association of Ice Cream Manufacturers . . . The latest form of the Copeland food bill (Committee Print 3) should be amended so that it will not give authority to the Secretary of Agriculture to designate what name a food shall be called, according to some who have studied this measure. . . . Federal Trade Commission has dropped its case against Shefford Cheese Co., which was charged with price discrimination in violation of the Robinson-Patman Act, but it has issued a complaint against Good Humor Corp. of America for alleged unfair competition.

• *A maximum of ten million bushels of potatoes will be diverted to livestock feed under a program set up by AAA, and a small quantity of sweet potatoes will be diverted to starch and other byproducts . . . A code of self-regulation has been adopted by brewer members of United Brewers Industrial Foundation, under which intemperance and anti-social conditions in the consumption of beer are opposed and quality of product and truth in advertising are upheld . . . A boycott of Japanese goods, effective Nov. 15, was ordered by Alaska Fishermen's Association in protest against alleged Japanese inroads into Alaskan salmon fishing grounds.*

• Tests indicating high efficiency for the vacuum-carbon dioxide method of grading eggs apparently are resulting in wide adoption of this method . . . A condition of hop plants known as "slip-down," in the past regarded as a varietal characteristic, has been identified as a virus disease . . . A manual covering suggested procedure for surveying wiring conditions in the plant, for the purpose of locating undesirable and hazardous conditions, has been prepared by Anaconda Wire & Cable Co.

• *One of the industrial relations problems of management is the combating of tuberculosis. Christmas Seals, the sale of which will help finance the battle against this disease, have been put on sale by National Tuberculosis Association.*

MEN, JOBS *and* COMPANIES

Industry

» ABRAHAM BROS. has completed a $35,000 addition to its packing plant at Memphis.

» ARMOUR & Co. is completing a $1,000,000 building at South Omaha, Neb.

» CASPER (WYO.) BREWING Co. has completed a new $125,000 brewery.

» COCA-COLA Co. has purchased a $240,000 building at St. Louis, where it will manufacture syrups for bottling plants in the Midwest.

» CONTINENTAL BAKING Co. will construct a modern plant, to cost about $50,000, at Albany, N. Y.

» CUDAHY PACKING Co. has reopened its Scranton, Pa., branch, closed in December, 1935.

» GENERAL FOODS CORP., New York, is issuing to stockholders a pocket-size newspaper which conveys news of the company's activities.

» GERBER PRODUCTS Co. has built new additions to its plant at Fremont, Mich., where it packs strained foods for infants.

THEODORE G. MONTAGUE

He succeeds the late Arthur W. Milburn as president of Borden Co., New York. He formerly was vice-president in charge of fluid milk and ice cream operations. George M. Waugh, Jr., was elected executive vice-president of Borden, Stanley M. Ross was elected to the executive committee and Harold W. Comfort and Robcliff V. Jones were elected vice-presidents.

HOME PACKING Co. will construct a modern meat plant at Riverton, Wyo.

» K. & B. PACKING Co., Denver, said to be the largest independent packing company in Colorado, has leased the plant of San Luis Valley Packing Co., near Alamosa.

» KRAFT-PHENIX CHEESE CORP. is erecting a distributing unit at Jacksonville, Fla.

» KUNER PICKLE Co., Empson Packing Co. and Kuner-Empson Co. have consolidated under the name of the latter.

» MCGOUGH BAKERIES, Montgomery, Ala., has opened a new $100,000 plant, laid out for straight-line production. Its traveling-tray oven has a capacity of 1,500 loaves an hour.

» RALSTON PURINA Co., INC., St. Louis, will build a six-story top addition on its present two-story building. The new eight-story and basement unit will be approximately 70x200 ft.

» RIO GRANDE VALLEY CITRUS EXCHANGE has erected a $50,000 grapefruit-juice processing plant at Mission, Texas.

» SOUTH GEORGIA ICE Co. opened a new meat curing and cold storage plant in Cochran, Ga., on Nov. 3.

» STOKELY BROS. & Co., INC., has purchased a 5-acre site at Mercedes, Texas, and will build a new canning plant for next season's operations.

» SWIFT & Co. has leased a 12,000-sq.ft. cooling and storage space at Greeley, Colo., for packing turkeys for the Eastern market.

» WESLACO (TEXAS) CITRUS ASSOCIATION is building a 120x140-ft. packing plant, which will have a capacity of about 800 cars a season.

» W. F. WICKHAM PACKING Co. is erecting a $100,000 packing plant near Sapulpa, Okla.

Personnel

» J. L. ALBRIGHT, Columbus Food Products Corp., has been reelected president of Wisconsin Canners' Association.

» EARL D. BABST, chairman of the board of American Sugar Refining Co., New York, has been succeeded as chief executive officer by Joseph F. Abbott, president. Mr. Babst continues as chairman.

L. A. WILLIAMSON

He is the new vice-president of Grennan Bakeries, Inc., Chicago. For the past twelve years he was connected with Ward Baking Co. in the capacity of regional manager of the Western division.

MARIAN VAN

Formerly food editor of the San Francisco Chronicle, she has been appointed director of the editorial division of Wheat Flour Institute, Chicago, as successor to Mrs. Josephine Beardsley, resigned. This change in personnel accompanies plans for additional services to newspapers and magazines by furnishing them with feature articles and "shorts."

» GEORGE BECK has become treasurer and manager of Mary Anne Bakeries, Inc., Chicago. He formerly was with Schwefer's Bakery.

» R. M. BOHN, formerly director of the Technical Institute of the Independent Biscuit Manufacturers' Co., has joined American Bakeries Co., Atlanta. He is assistant to John A. Wyat, who is

in charge of the production of biscuits and crackers and bread.

» CLINTON L. BROOKE, formerly research chemist with Pillsbury Flour Mills and more recently with Quaker Oats Co., has gone with National Grain Yeast Corp., Belleville, N. J.

» DR. A. E. CLIFFE, formerly chief chemist of Standard Brands, Ltd., Toronto, is now with the sales division of Quaker Oats Co. of Canada, Peterboro, Ontario.

» LESTER S. DAME has been elected president of National Macaroni Manufacturers' Association. His headquarters are in New York.

» THOMAS W. HARRIS has been elected secretary-treasurer of Gunnison Sugar Co., Salt Lake City.

» JOHN HOLMES, vice-president of Swift & Co., Chicago, since 1928, has been elected president of the company, succeeding G. F. Swift, Jr., who became vice-chairman of the board.

» S. B. HORRELL, Carey Salt Co., Hutchinson, Kan., has been designated general chairman of the food-section executive committee of National Safety Council, Inc.

» FRENCH JENKINS has been named vice-president and general manager of LaChoy Food Products, Inc., Chicago. Mr. Jenkins had been sales manager.

» J. E. KING, Leesburg, heads up Florida Bottlers of Carbonated Beverages.

» PHILIP KRAFT has acquired sole ownership of South Side Baking Co., Indianapolis, and is the president. He had been secretary-treasurer.

» RUSSELL S. MCBRIDE, who serves as the editorial consultant of FOOD INDUSTRIES in Washington, D. C., has removed his offices from the Colorado Building to 712 Jackson Place.

» EUGENE H. MCKAY, for 10 years vice-president and director of Kellogg Co., Battle Creek, has been appointed to an executive position with National Biscuit Co., with headquarters in Battle Creek.

» JOHN M. POWELL has become manager of the Swift & Co. plant at Lake Charles, La., which is nearing completion. Mr. Powell had been at the Swift plant in Moultrie, Ga., for sixteen years.

» JAMES E. MUNSON has been appointed assistant general manager of Narragansett Bay Oyster Co., Warren, R. I. Mr. Munson formerly was editor of *Atlantic Fisherman, Fishing Gazette* and *Canadian Fisherman.*

» WALTER A. TELPEL, for many years vice-president and general manager of Froedtert Grain & Malting Co., Milwaukee, has been elected president.

» JOSEPH WILSHIRE, president of Standard Brands, Inc., New York, since 1925, has been elected chairman of the board, a newly created office, and Thomas L. Smith, formerly first vice-president, has become president. Paul W. Fleischmann is now first vice-president.

» JOHN WIRTH, Louisville, has been elected president of Kentucky Master Bakers' Association.

Deaths

» RICHARD C. BRAKE, JR., manager of the Henderson, N. C., plant of Pine State Ice Cream Co., Nov. 3.

» HARVEY T. BROWN, secretary-treasurer and a director of Sheffield Farms Co., Inc., New York, Nov. 15. He

Have you a Packaging Problem?

. . . EXPERIENCE will solve it

The Package Machinery Company has served America's leading packaged goods manufacturers since the days when machine wrapping was first introduced. We have helped to solve hundreds of packaging problems in virtually every field of industry involving packaged production.

Today, our large line of wrapping machines includes equipment to wrap practically any type of package. Most of our models are highly adjustable . . . handle a wide range of sizes, and use any type of wrapping material. Our machines wrap such widely different products as: razor blades, soap, chewing gum, candy, chocolate bars, "Cellophane"-hooded bottles, as well as the standard type of carton.

These complete facilities and our wide experience can be of value to you . . . in planning and producing the kind of package best suited to your product from both the sales and production standpoints.

Consult our nearest office.

PACKAGE MACHINERY COMPANY, Springfield, Massachusetts

NEW YORK CHICAGO CLEVELAND LOS ANGELES

Peterborough, England: Baker Perkins Ltd. Melbourne, Australia: Baker Perkins Pty., Ltd.
Mexico, D. F., Apartado 2303 Buenos Aires; Argentina: David H. Orton, Paipu 231

PACKAGE MACHINERY COMPANY

Over a Quarter Billion Packages per day are wrapped on our Machines

entered the dairy business as a milk-wagon driver.

» JOHN B. BUSCH, JR., 71, president of John B. Busch Brewery, Washington, Mo., Oct. 24.

» ROBERT L. CORBY, 54, authority on baking technology and former vice-president of Fleischmann Co., New York, Oct. 30, at Ridgewood, N. J. He helped to found Corby Yeast Co., Langdon, Md., which was consolidated with Fleischmann Co.

» MARS GUINDON, 55, superintendent of the Fort Lupton, Colo., factory of Great Western Sugar Co., and widely known sugar technologist, Nov. 3.

» JACOB N. HERSHEY, former president of Eatmor Chocolate Co., Pittsburgh, and vice-president of Hershey Creamery Co., Harrisburg, recently.

» EDMUND M. KELLY, 81, who served as president of Liberty Mills, Nashville, for nearly 50 years, Nov. 3. He had been president of Southern Millers' Association for 25 years, a past president of Millers' National Federation and second vice-president of Nashville Grain Exchange.

» JOSEPH H. REITEMEIER, 76, operator for 52 years of the Logansport, Ind., candy manufacturing business bearing his name, Oct. 25.

» MARVIN C. REYNOLDS, president of Emulsol Products and formerly member of Epstein, Reynolds & Harris, consultants on margarine and mayonnaise products, Oct. 11.

» WILLIAM B. THURBER, 69, chairman of the board of Walter Baker Chocolate Co., Nov. 12, at Milton, Mass. After joining Walter Baker in 1899, he served as superintendent, general manager, vice-president and president.

Associated Industries

» AMERICAN CAN CO. has established a testing kitchen in New York to aid customers in developing recipes for use on their labels or in promotional or advertising material.

» AMERICAN LABEL CO. has established General Lithographic Corp., with offices and plant in New York.

» AMERICAN ROLLING MILL CO. recently opened its new ultra-modern research laboratories at Middletown, Ohio. The research building, which has 43,500 sq. ft. of floor space, cost $280,000.

» CATERPILLAR TRACTOR CO., Peoria, Ill., announces the election of A. T. Brown as executive vice-president and names two new vice-presidents, L. B. Neumiller and D. G. Sherwin. B. A. Robison has been elected treasurer.

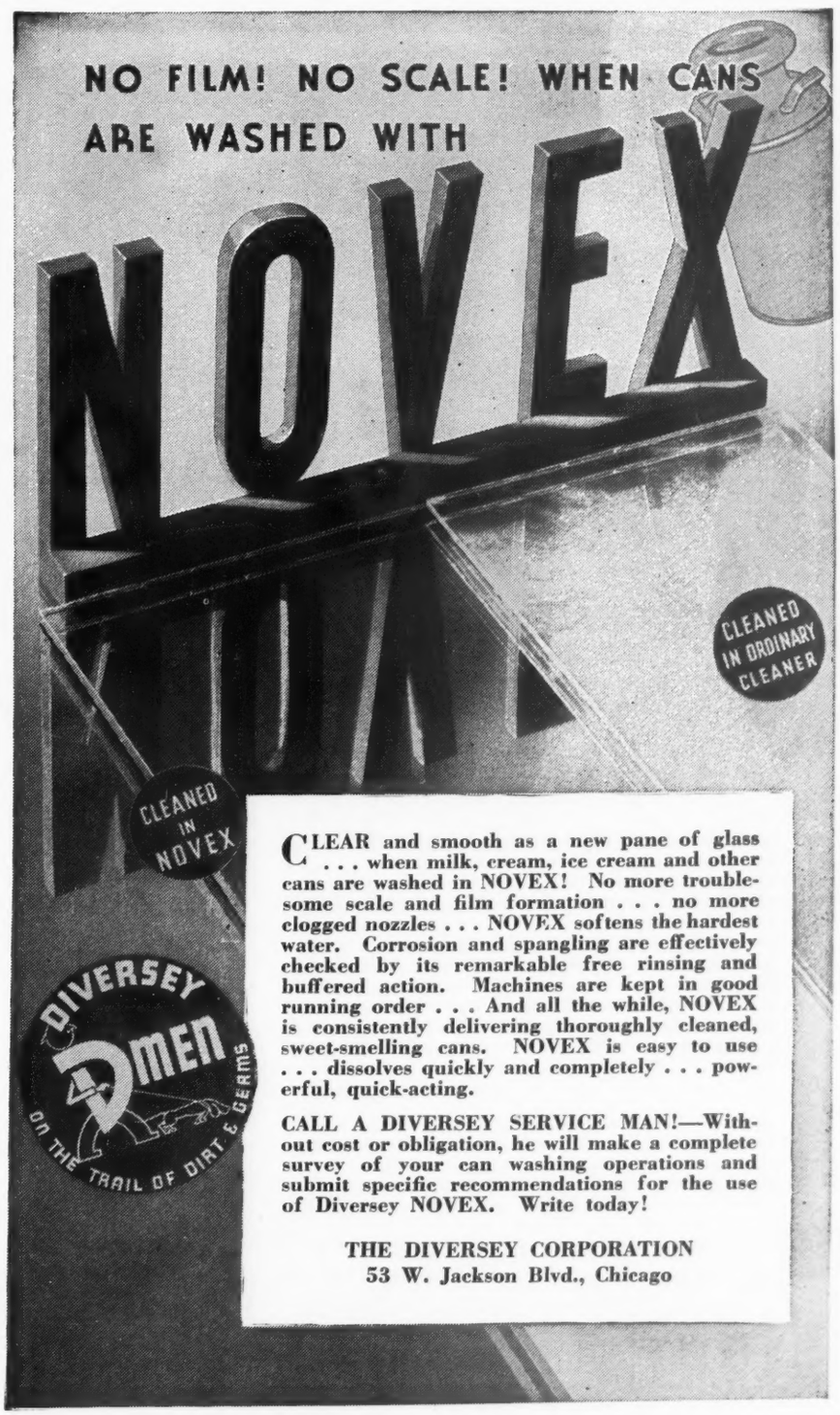
» FEDERAL MOTOR TRUCK CO., Detroit, has appointed K. M. Schaefer assistant to the general manager, assigned to sales.

» LINCOLN ELECTRIC CO. has opened a new sales office in Phoenix, Ariz., with R. J. Reardon in charge.

» PATTERSON FOUNDRY & MACHINE CO. has appointed E. S. Boston district sales manager, with headquarters at St. Louis.

» ROOTS-CONNERSVILLE BLOWER CORP. has appointed as distributors of turbine pumps Buffalo Mill Supply Co., Inc., Buffalo, and F. W. Allen & Son, Erie, Pa.

» WILSON & BENNETT MFG. CO. has appointed John T. Gossett Eastern sales manager, with headquarters in Jersey City.


NO FILM! NO SCALE! WHEN CANS ARE WASHED WITH
NOVEX
CLEANED IN ORDINARY CLEANER
CLEANED IN NOVEX
DIVERSEY
DMEN
ON THE TRAIL OF DIRT & GERMS
CLEAR and smooth as a new pane of glass . . . when milk, cream, ice cream and other cans are washed in NOVEX! No more troublesome scale and film formation . . . no more clogged nozzles . . . NOVEX softens the hardest water. Corrosion and spangling are effectively checked by its remarkable free rinsing and buffered action. Machines are kept in good running order . . . And all the while, NOVEX is consistently delivering thoroughly cleaned, sweet-smelling cans. NOVEX is easy to use . . . dissolves quickly and completely . . . powerful, quick-acting.
CALL A DIVERSEY SERVICE MAN!—Without cost or obligation, he will make a complete survey of your can washing operations and submit specific recommendations for the use of Diversey NOVEX. Write today!
THE DIVERSEY CORPORATION
53 W. Jackson Blvd., Chicago

Can Company Research

(*Continued from page 709*)

of canned shrimp and an increase in the annual production and consumption of this valuable iodine-bearing food.

Fruit Juices

Previous to 1927, canned tomato juice was an article practically unknown to the consuming public. Today, it is common to find a case or at least a few cans in almost every kitchen pantry in this country. It is also meeting favorable reception abroad. This did not happen accidentally. Through the cooperative work done by the research department of the can manufacturer with the canners of tomato products, solutions were obtained to the problems incidental to the manufacture and canning of this item. These included the determination of choice of varieties of tomatoes to be used, optimum maturity of the fruit to secure the desired brightness of color, consumer choice of consistency, and practices to be employed in securing best flavor. Manufacturing procedures to these ends were developed consistent with the requirements of stabilization of the full nutritional value of the juice. Several items of equipment previously unknown or not previously used by canners of tomato products are now used extensively in the manufacture of canned tomato juice. The equipment was selected on the basis of its efficiency and ability to produce a product free from metallic contamination. As the result of extensive trial packs, choice of container, filling conditions, and optimum sterilizing processes were determined.

In addition to tomato juice, large quantities of the juices of grapefruit, pineapple, oranges, and prunes, and lesser quantities of the juices of lemons, limes, tangerines, the berries, and cherries, and the juices of some of the vegetables, are articles of commerce. Research work by the can manufacturer has contributed no small part in the successful production of these commodities, and will play an important role in perfecting them in accordance with the apparent trade demand.

Analytical Procedure and Quality Control

Considerable time is spent by the chemists, bacteriologists, and microanalysts in developing new and in applying recognized analytical methods to the problems of food research. In such work unusual accuracy is frequently necessary.

Control over the quality of the materials used in manufacturing cans is an exceedingly important function of the research department of a can manufacturer. A complete list of these materials with the specifications under which they are purchased would make a formidable book.

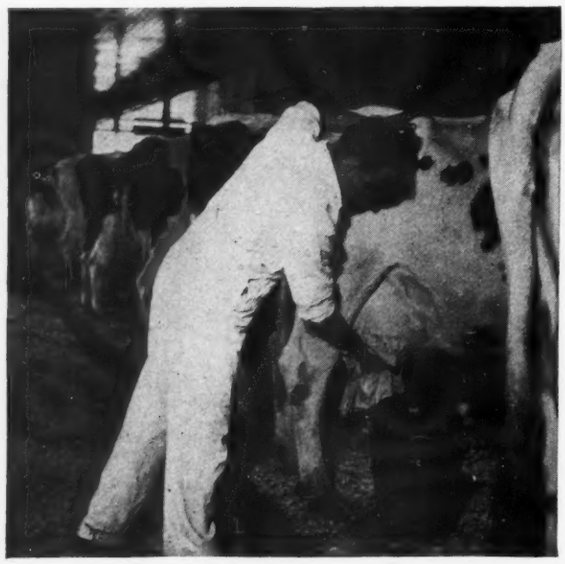
Improved Containers

In 1915, cooperative research was started by the National Canners Association with the American Sheet & Tin Plate Company and the American Can Company, having for its purpose the improvement in quality of the tin plate being used in the manufacture of food containers. This was the beginning of the intensive research which lead to the production of "Type L plate," which is a cold-reduced tin plate of very low metalloid content, highly resistant to the corrosive action of fruits and other acid foods. Cans made from this plate have very markedly lengthened the the shelf life of the more acid canned foods. This development is one of the most valuable contributions which the manufacturers of tin plate and the can manufacturers have made to the public.

PROTECT MILK FROM COW TO CONSUMER

•

HIGH COUNT PROBLEMS BEGIN AT THE FARM



PLANT OPERATORS!—*Recommend* HTH-15 *to your producers*

THE use of HTH-15 on the farm and Lo-Bax in the plant makes possible a complete sanitation routine that gives the same high standard of protection at every step from cow to consumer.

Plant operators can recommend HTH-15 to their producers with confidence. They know it always has the same high germ-killing power—that it's so simple and convenient to use that producers can't go wrong—that the corrosion factor of HTH-15 has been lowered to a point that eliminates danger to cans and utensils.

Most important of all, HTH-15 is so economical that producers can afford to use it on *all* their equipment and utensils. A teaspoonful of HTH-15 powder in water makes 3 gallons of a *sodium* hypochlorite rinse solution at a cost as low as one-fifth cent per gallon.

Write us today for details and literature on "The Micro-Cleanliness Plan for Milk Producers."

The MATHIESON ALKALI WORKS *(Inc.)*
60 East 42nd Street New York, N. Y.

Soda Ash . . . Liquid Chlorine . . . Bicarbonate of Soda . . . HTH-15 and Lo-Bax . . . Caustic Soda . . . Bleaching Powder . . . Ammonia, Anhydrous and Aqua . . . NuFos *(Briquet Cleanser) . . . Solid Carbon Dioxide.*

HTH-15 THE LOW-COST WAY TO LOW-COUNT MILK

Problems in the Dairy Industry

(*Continued from page 710*)

evaporated milk is produced largely in those areas remote from the city milkshed, and I am sorry to say that, generally speaking, the raw milk quality requirements are not as rigid as for the fluid milk business. This matter of raw supply quality constitutes one of the coming problems of the business, but perhaps the outstanding problem in the evaporated milk business is to develop a process which will result in a milk of normal flavor and color.

Ice Cream

Improvements in the manufacture of ice cream have been rapid. The greatest improvements have been, first, the development of refrigeration, which made it possible to use brine or direct-expansion freezers in the place of ice and salt freezers, and more recently the direct-expansion continuous freezer, whereby a constant stream of mix and flavorings enter the freezer at one opening and a contant stream of ice cream at a temperature of approximately 21 deg. F. leaves the freezer at another opening.

In the manufacturing operation there is room for further improvement in machinery, and there exist some technical problems such as the effect of type and quality of ingredients used on flavor and texture, and cause and remedy for cardboard flavor.

There is still much to be done on the selection and treatment of fruits and flavors added to the ice cream mix after pasteurization, as these items may affect the bacteria and *B. coli* count of the finished ice cream.

There is still considerable variation in opinion as to the best type of ice cream, particularly with respect to its butterfat content and texture, that will result in maximum consumption.

Since ice cream is largely sold through dealers, there exists the problem of speed of turnover of ice cream to insure its freshness, the problem of temperature at which ice cream is served, and the problem of sanitation in the premises where it is sold. All of these are sure to receive more attention in the near future.

Cheese

With the improvement in the quality of American cheese and with the development of innumerable varieties and ways of using cheese, the consumption in the United States is on the increase, being in the vicinity of 5 lb. per capita, annually. However, the cheese manufacturer has a very real problem to develop a consumption as great as that in some of the European countries, Switzerland, for example, where consumption is about 16 lb. per capita per year. Increased consumption in this country will result from research on improved quality, keeping properties, and the development of new varieties.

Miscellaneous Problems

A few miscellaneous problems that might be mentioned include: The development and selection of the proper cleaning compounds for dairy equipment. Variation in the composition of the water supply in different parts of the country makes this a problem.

Much work has been done on the disposal of dairy wastes from country plants where sewers are not available. No real satisfactory inexpensive method has as yet been developed.

The personnel problem, common to all industries, is a very important matter in the dairy industry where so much depends on doing the same thing twice alike and doing it neatly.

Color . . . .
Freshness . . .
Fragrance . . .
exture . . .
. . Essential to YOUR Products
. . Attainable with Proper Air Conditioning
Vilter Refrigeration and Air Conditioning has meant new Profits for Meat Processors for many years. Better Quality Products are a certainty with Vilter Equipment to guard against spoilage, shrinkage, loss of color and flavor and appetizing appearance.
Vilter Air Conditioning Equipment has more than paid for itself in the leading Meat Packing and Processing plants in the country. Why not call in a Vilter Engineer now and find out how you can increase your plant efficiency and production, your product quality and sale?
VILTER COMPRESSORS . .
The Heart of every Vilter Air Conditioning System is the famous Vilter Compressor. Here, then, is the main reason why "Air Conditioning by Vilter" always means the last word in dependable operation, efficiency and year-after-year economy.
VILTER
Manufacturing Company
2118 South First Street
Milwaukee - Wisconsin

NEW DISCOVERIES

(*Continued from page 723*)

such ratio that the metals are present in the proportions: copper 75, nickel 20, cobalt 5 per cent. After thorough washing with water (by repeated decantation) the precipitate is mixed with twice its weight of kieselguhr. This catalyst need not be reduced.

When used in hardening sardine oil under a high pressure of hydrogen, it gives a better yield than does the customary reduced nickel catalyst. Pressures up to 50 atmospheres were employed in a small hydrogenation autoclave which was well shaken during the reaction. The usual reaction temperature was 180 deg. C. (356 deg. F.) continued for 40 minutes, but some experiments were also made at 120, 140, 160 and 200 deg. C. (248, 284, 320 and 392 deg. F.). As would be expected, increases in pressure or temperature increase the rate of hydrogenation, but at 200 deg. C. there is a sudden more rapid increase in reaction velocity.

Digest from "High Pressure Hydrogenation of Oils with a Multicomponent Catalyst," by S. Ueno, Z. Okamura and S. Ueda, *Journal of the Society of Chemical Industry (Japan)*, 40, 292B, 1937.

VITAMINS

Vitamins and Vision

THERE IS MUCH EXPERIMENTAL and clinical evidence to show that vitamin deficiency is one of the potent causes of impaired vision and diseases of the eye. A definite and distinct relation has been observed between vitamin C deficiency and cataract, and there are evidences of similar relations with other eye diseases. Plainly there is an essential place for vitamin C in the functioning of the crystalline lens and the aqueous humor of the eye and, in further proof, it has been found by analysis that the aqueous humor does actually contain a significant proportion of ascorbic acid (vitamin C).

Approaching the problem from the other angle, namely the proper use of vitamins in the diet for prevention or treatment of eye diseases, when avitaminosis is known or suspected to be a factor, there is still much research to be done. More and more attention is being given to the possibility that two or more vitamins may work together more effectively than any one vitamin alone. Such an effect seems probable in view of the fact that other vitamins than C have been found present in different parts of the eye, but the idea is relatively new and there is as yet no conclusive evidence on this point.

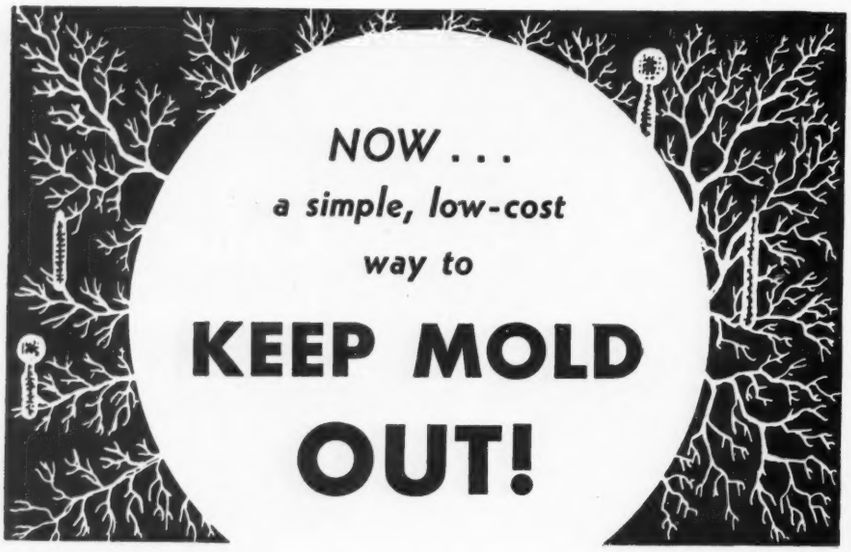
It can be said with certainty, however, that vitamin therapy can be beneficially employed both for treatment of symptoms already present and for safeguarding the healthy eye.

Digest from "Vitamins and Ophthalmology," by Eugen Baroni, *Oesterreichische Chemiker-Zeitung*, 40, 249, 1937.

MISCELLANEOUS

Microscopy of Cinnamon

SPECIMENS OF CINNAMON from China, Ceylon and the Dutch East Indies have been compared by microscopic examination. Ceylon and East Indies cinnamons contain very little starch, which is present in fine, small grains. Chinese cinnamon contains relatively much more starch and it appears as large, swollen grains or fragments of grains. The swollen grains are not the same as cereal starch grains which are merely large in size; the swelling imparts different refraction behavior, with differences also in dimensions (even though the grain size may be about the same) and also in response to stains.



Do you have trouble keeping mold from forming in food storage rooms? Would you like to know about a simple method that helps prevent it . . . that helps avoid losses due to its presence?

Then here is good news for you . . . a simple, inexpensive method has been developed that has proven highly successful in many plants. This brand new idea employs in a NEW way the powerful mold and bacteria killing properties of OAKITE BACTERICIDE. Let us tell you about this unique method.

Where Can This Method Be Applied?

In storage rooms for eggs, meats and perishable foods; in storage cellars such as those found in breweries, wineries, and distilleries; meat curing rooms; in storage rooms for fruits such as oranges, lemons, apples, grapes; cellars, caves and buildings growing mushrooms.

Don't delay . . . write today. No obligation.

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TRADE MARK REG U.S. PAT OFF.
SPECIALIZED INDUSTRIAL CLEANING MATERIALS & METHODS

But most characteristic of all is the fact that the swollen starch grains of Chinese cinnamon, unlike large cereal starch grains, appear optically isotropic in polarized light. This permits positive identification of the starch as distinguished from the true cinnamon components of Chinese cinnamon, because the cinnamon particles are smaller than the swollen starch grains and are optically anisotropic in polarized light.

Digest from "Microscopic Examination of Cinnamon," by B. Hazslinsky, *Zeitschrift für Untersuchung der Lebensmittel*, 74, 37, 1937. (Published in Germany.)

Coffee Substitute

AN IMPROVEMENT in the production of harmless, caffeine-free coffee substitutes from cereal grain involves a novel treatment for bringing the starch granules into the most suitable condition for roasting. As described in German Patent 645,944 (granted June 5, 1937, to Firma Heinrich Thams, Hamburg, Germany), grains of a cereal such as rye, wheat or barley are first soaked in an aqueous solution of an organic acid. An edible water-soluble acid is selected, tartaric and citric acids being among those preferred. After the grain has been well soaked in this solution it is treated with steam under such conditions that the starch granules are perceptibly attacked. In this condition the treated grain gives exceptionally good results in the roasting stage of the process, which is carried out in the manner already known and customary in the manufacture of cereal coffee substitutes.

Peanut Meal as a Food Ingredient

THOUGH THE USE of peanut meal in cookery can hardly be classed as a new discovery, the publication cited here is a source of information on a wide variety of culinary dishes which may be made with peanut meal.

"Peanut Meal, Food Value and Uses," by Leah Ascham, Bulletin 195, Georgia Experiment Station, Experiment, Ga.

Composition of Soy Beans

IN VIEW OF THE IMPORTANCE OF SOY BEANS both as a food crop and as a source of industrial raw materials, numerous investigators have studied the chemical composition of the beans. One of the latest of these studies, carried out in the Pharmaceutical Institute of the Imperial University of Tokyo, is devoted to the soy bean saponins. Two forms of saponin, one crystalline and the other amorphous, can be obtained from soy beans after removing the oil and lecithin. Hydrolysis of both types reveals, by analysis of the hydrolysis products, that the saponins are built up from rhamnose and galactose as the sugar components, coupled with glucuronic acid and neutral sapogenols.

Most of this research was devoted to investigating the chemical origin of the soy bean sapogenols, since these are the essential and characteristic component of the saponins. Four different sapogenols were identified, their only chemical difference being in their oxygen content. Their chemical reactions and the composition of their oxidation and reduction products show them to be triterpene alcohols. This relates them, chemically and as plant products, to the great class of terpenes and terpenoids which includes turpentine, camphor and many essential oils from which flavors and perfumes are made. It also settles the question as to whether soy bean saponins were derived from sterols or from terpenoids, and will be helpful in directing the search for uses of the saponins as soy bean byproducts.

Digest from "Soy Bean Saponin," Parts I and II, by E. Ochiai, K. Tsuda and S. Kitagawa, *Berichte der deutschen chemischen Gesellschaft*, 70, 2083, 2093, 1937. (Published in Germany.)

PRODUCTION PROBLEMS SOLVED TO ORDER

ALMOST every modern plant in the food industries is already applying the Continuous Flow Principle in some degree. All bottle, can or carton filling machines and most labeling and wrapping machines are based upon this principle.

The next step is to unify the operation of the entire plant so that there is Continuous Flow at maximum speed from the receiving of raw materials to the shipping of finished product.

Mathews engineers are trained to see production as one total process based upon Continuous Flow. A Mathews survey is problem solving to order, revealing bottlenecks if they exist, placing every processing step in its logical sequence, eliminating lost motion and unnecessary handling.

Mathews systems, backed by over 32 years' engineering, make maximum logical use of gravity, and include Roller, Wheel, Belt, Live Roller, Drag Chain, Pallet, Continuous Apron, Trolley Conveyers, Vertical and Inclined Elevating Conveyers, Spiral Roller Conveyers and Spiral Chutes.

"Problems Solved with Mathews Conveyer Systems" is a book which illustrates many typical examples of the Continuous Flow Principle. Write for it today.

The illustration at the left shows an efficient layout of conveyers in the bottling house of a Pennsylvania Distillery. An inclined, level, declined, and level belt conveyer with roller conveyer is used to convey empty cartons from warehouse to packers.

An outstanding application of the Continuous Flow Principle of Handling Materials. A four-tier bread cooler handling 35,000 loaves per day.

MATHEWS CONVEYERS

CONTINUOUS FLOW PRINCIPLE IN HANDLING MATERIALS

MATHEWS CONVEYER COMPANY
116 Tenth Street, Ellwood City, Penna.

Exposition of Chemical Industries

(*Continued from page 692*)

gases or entrained particles and water. Also a venturi dust collector.
BOWEN RESEARCH CORP., *Garwood, N. J.*

Bar-Nun rotary sifter for bolting flour and sifting other finely divided dry materials. B. F. GUMP CO., *Chicago, Ill.*

Vibrating screens.
LINK-BELT CO., *Chicago, Ill.*

Electric vibrating screens.
JEFFREY MFG. CO., *Columbus, Ohio.*

Vibrating screens of light type.
KORB-PETTIT WIRE FABRICS & IRON WORKS, INC., *Philadelphia, Pa.*

Magnetic pulley for removing iron from conveyed dry materials. Also a magnetic separator (De-Ironer) for powders and one for solutions or pastes.
DINGS MAGNETIC SEPARATOR CO., *Milwaukee, Wis.*

Electromagnetic screens (the Utah).
ALLIS-CHALMERS MFG. CO., *Milwaukee, Wis.*

Gyratory screening devices for wet and dry materials; sifting machines and laboratory test sieving machines.
GREAT WESTERN MFG. CO., *Leavenworth, Kan.*

Open top, 12-in. laboratory centrifugal with removable basket. Also a 40-in. suspended centrifugal with mechanical unloader and "Centroid" speed control.
FLETCHER WORKS, *Philadelphia, Pa.*

Perfect Circle sifters with controlled circular motion.
SPROUT, WALDRON & CO., INC., *Muncy, Pa.*

Distillation equipment of laboratory and pilot-plant size, made of glass-lined steel. Other glass-lined laboratory equipment such as an autoclave, evaporating dish and tanks of glass-lined steel.
PFAUDLER CO., *Rochester, N. Y.*

Filter presses, with diaphragm pumps, used for oils, syrups, honey, vinegar, wine.
T. SHRIVER & CO., *Harrison, N. J.*

Abbé-Herman screen specialties used in filtering, dewatering, screening and centrifuging. Also Abbé Blutergess turbine sifter.
ABBÉ ENGINEERING CO., *New York, N. Y.*

(*a*) Sutton, Steele & Steele air table used in separations of peanuts, cocoa nibs, coffee, peas, etc.

(*b*) Sutton, Steele & Steele electrostatic separator.

(*c*) Gyro-Whip sifter for flour and other foods.
SEPARATIONS ENGINEERING CORP., *New York, N. Y.*

Thickeners to be used for sewage and plant waste. Water-treatment plants, including mixers, flocculators and clarifiers.
DORR CO., INC., *New York, N. Y.*

Air classifier for laboratories and small plants. It classifies and conveys in one operation.
FEDERAL PNEUMATIC SYSTEMS, INC., *Chicago, Ill.*

Filters.
OLIVER UNITED FILTERS, INC., *New York, N. Y.*

Storing

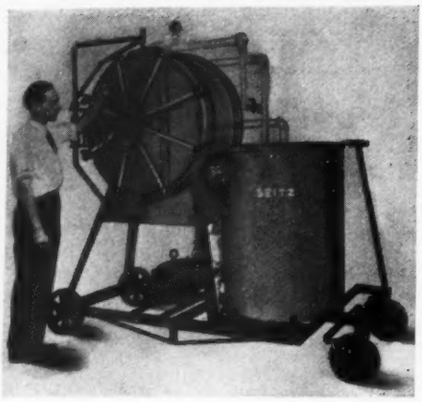
IN BOTH FOOD AND CHEMICAL PROCESSING PLANTS, the storage problem involves the provision of tanks which will resist corrosion. And in food plants, these vessels must be of a material that will not impair flavor. So visitors to the exposition will see much in the way of stainless-steel and glass-lined-steel tanks. Capacities and construction will, of course, vary according to the particular service to which the tank is to be put.

Below are listed various units to be shown:

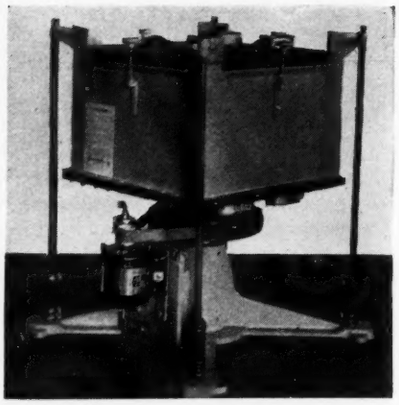
General utility glass-lined steel tanks with porcelain-enameled outside. Glass-lined steel tanks with side agitators, for holding wines, extracts and other volatile products. Also, open-top, center bottom-drain stainless steel tanks.
METAL GLASS PRODUCTS CO., *Belding, Mich.*

Corrosion-proof containers made of chemical stoneware.
GENERAL CERAMICS CO., *New York, N. Y.*
U. S. STONEWARE CO., *Akron, Ohio*

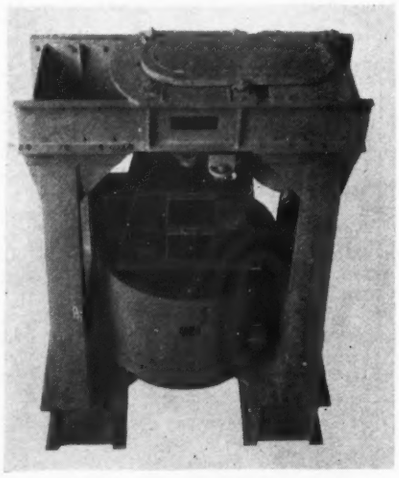
Metal containers and tanks.
BLAW-KNOX CO., *Pittsburgh, Pa.*
INGERSOLL STEEL & DISC DIV. OF BORG-WARNER CORP., *Chicago, Ill.*
REPUBLIC STEEL CORP., *Cleveland, Ohio*
PRESSED STEEL TANK CO., *New York, N. Y.*
LANCASTER IRON WORKS, INC., *Lancaster, Pa.*



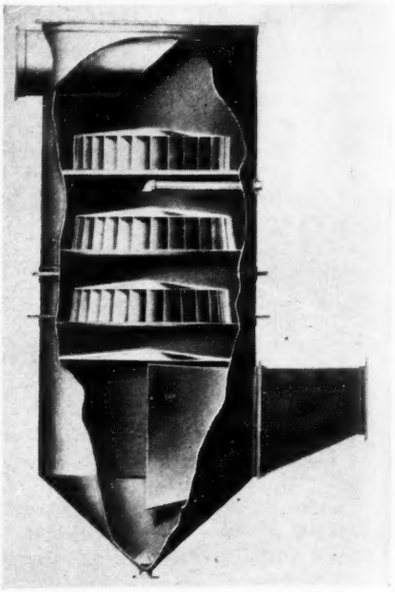
Oils and similar liquids are clarified in this new "alluvial" pressure filter. Known as the Seitz Tank Hercules, it has leaves of Monel metal screen.



This new Gyro-Whip screen, or sifter, to be exhibited by Separations Engineering Corp., has already found application in the flour milling industry.



Food plants may use this type of centrifugal. It is a bottom-discharge, suspended unit of Rochester Engineering & Centrifugal Corp.



Cutaway view of junior Multi-Wash dust collector for small plants. In this unit of Claude B. Schneible Co., the air spirals upward over wet vanes.

Glass-lined containers and tanks.
PFAUDLER CO., *Rochester, N. Y.*

Unclassified

While not in themselves equipment for performing unit operations, corrosion-resistant metals are widely employed in food-processing equipment. And displays demonstrating the characteristics of these metals should not be overlooked by food-production engineers. Such exhibits will be shown by:

ALLEGHENY STEEL CO., *Brackenridge, Pa.*
ALUMINUM CO. OF AMERICA, *Pittsburgh, Pa.*
AMERICAN STEEL & WIRE CO., *Chicago, Ill.*
ANTACIRON, INC., *Raritan, N. J.*
CARNEGIE-ILLINOIS STEEL CORP., *Pittsburgh, Pa.*
DURIRON CO., INC., *Dayton, Ohio.*
INGERSOLL STEEL & DISC DIV. OF BORG-WARNER CORP., *Chicago, Ill.*
INTERNATIONAL NICKEL CO., INC., *New York, N. Y.*
REPUBLIC STEEL CORP., *Cleveland, Ohio.*

BOOKS RECEIVED

THE SALE OF FOOD AND DRINK. By Harry C. W. Melick. Published by Prentice-Hall, Inc., 70 Fifth Ave., New York, N. Y., 1936. 346 pages; 9¼x6¼ in.; cloth. Price $5.

Far from being a treatise on merchandising, as the title might suggest, this book covers the legal aspects of the distribution of foods and beverages. It reviews the laws relating to the sale of food and drink and court decisions under these laws. Some 700 cases are covered. Particularly interesting to the manufacturer are chapters on implied warranties of quality, defective containers, manufacturers' and bottlers' liability to the consumer, negligence and damages. Written in non-legal language the book is easily understood by the layman.

FOOD PRODUCTS DIRECTORY, VOL. VIII, 1937–1938. Published by W. J. McCamman, 1202 Hearst Building, San Francisco, Calif. 820 pages; 10⅜x8¼ in.; cloth. Price $10.

The value of this publication lies in the fact that much of the business of the food manufacturer and processor is with other food manufacturers and processors. The book is a directory of canners, packers and manufacturers of food products; packers and shippers of dried fruits; bonded wineries and breweries; dealers in nuts, beans, popcorn and rice. Territorially, the publication covers the United States, its territories and Canada. Included in the directory is a buyers' guide, which includes the names of concerns that furnish supplies to canners, packers and shippers. Importers and brokers also are listed. Brands and labels, as well as the company names, are given. Advertisements appear at the side and top of the pages in the directory.

WHOLESALING. By Theodore N. Beckman and Nathaniel H. Engle. Published by Ronald Press Co., 15 East 26th St., New York, N. Y., 1937. 628 pages; 8½x5¾ in.; cloth. Price $4.

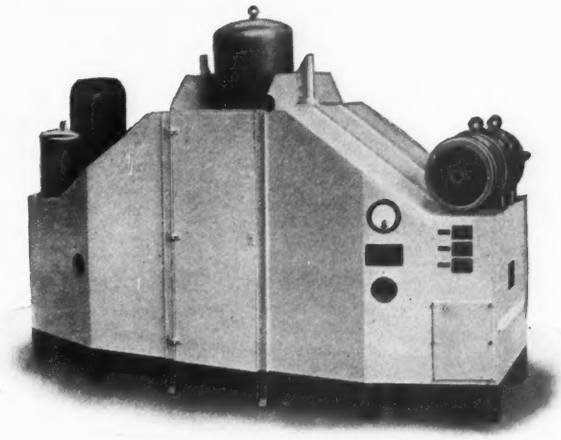
Taking the form of a scientific analysis of the wholesale function of business, this book will be of help to food-industry executives who wish a better understanding of that phase of distribution. The book is directed not only toward wholesalers but toward producers with selling problems and retailers with buying problems. To mention only a few chapters, the book covers the nature and economics of wholesaling, the wholesaling structure in the United States, the industrial distributor and his functions, circumventing the wholesaler, operation and management of a wholesale business, costs and profits in wholesaling, wholesale prices and pricing policies, trends in wholesaling, and wholesaling and the Government. By way of statistical material, there are 61 tables.

THE CASH BUDGET. Published by Metropolitan Life Insurance Co., 1 Madison Ave., New York, N. Y., 1937. 40 pages; 8½x10¾ in.; paper. Free. This is based on the cash-budget procedures of 45 companies.

THE EXAMINING DENTIST IN FOOD HAZARD CASES. By C. A. Levinson, D.M.D. Published by the Murray Printing Co., Cambridge, Mass., 1937. 58 pages; 5½x8½ in.; cloth. Price $2. Information is presented concerning the studies that confront the dentist who examines consumers alleging dental damage from foreign material in food.

FLOUR-MILL INSECTS AND THEIR CONTROL. By G. A. Dean, R. T. Cotton and G. B. Wagner. Published by U.S. Department of Agriculture as Circular No. 390; revised, 1937. 40 pages; 5⅞x9 in. Price 5 cents. This contains practical information.

COMPLETE DESTRUCTION
OF
INSECT LIFE
The electrical process provided by the



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is the only one which penetrates closed packages to destroy any stage of insect life, with the machine operating as a unit of the packaging line.

Write for the new bulletin describing the Entoleter and its use.

PRODUCTS PROTECTION CORPORATION
AFFILIATED WITH THE SAFETY CAR HEATING AND LIGHTING COMPANY

Executive Offices: 230 Park Avenue, New York, N. Y.
820 Flour Exchange, Minneapolis, Minn.
Laboratory and Factory: New Haven, Conn.

PATENTS

Doughnut Cooking Machine Operating Through a Vertical Plane—Charles E. Carpenter, Crystal Lake, Ill. No. 2,092,302. Sept. 7, 1937.

Plastic Cream Products Made from 55 to 60 Per Cent Butter-Fat Cream by Heating and Holding at a Temperature of About 195 Deg. F. For One Hour With Agitation, Cooling to 40 Deg. F. For Two Hours and Rewarming to About 85 to 87 Deg. F. With Agitation, and Recooling With Agitation to 50 Deg. F.—John H. Nair, Syracuse, N. Y., to Borden Company, New York, N. Y. No. 2,092,324. Sept. 7, 1937.

Dried Fruit Given From 200 to 500 Deg. F. Dry Heat Treatment and Mechanical Kneading or Squeezing Preliminary to Immersion in Boiling Water, Draining, and Packing—Henri Daniel Rey, Papeete Tahiti to The Anglo California National Bank, San Francisco, Calif. Nos. 2,092,776 and 2,092,777. Sept 14, 1937.

Pineapples Trimmed, Cored, Cut Into Longitudinal Segments, and Packed In Original Shape As A Unit Into Containers—William E. Taylor, West Orange, N. J., to American Can Co., New York, N. Y. No. 2,092,786. Sept. 14, 1937.

Bakery Products Given an Under-Surface Coating of Granular Material By Mechanical Means in Course of Feeding Onto a Traveling Baking Hearth—Eugene Oscar Engels and Emil W. Plambeck to Baker Perkins Co. Inc., Saginaw, Mich. No. 2,092,836. Sept. 14, 1937.

Food in Capped Containers Sealed Under Reduced Pressure to Give Less Than Atmospheric Pressure in Container—Robert J. Stewart and John E. Erhart to Crown Cork and Seal Co., Inc., Baltimore, Md. No. 2,092,860. Sept. 14, 1937.

Bread Loaves Packaged By Wrapping in Lightly Waxed Papers Sealed With Folded Overlapping on End Supplemented by Paper Sheets on Which is Used Rubber Latex Adhesive—Henry Edward Hildebrand, Mount Vernon, N. Y., to Continental Baking Co., New York, N. Y. No. 2,092,916. Sept. 14, 1937.

Frozen Flesh Foods Given a Non-Cracking Ice Glaze Formed by a Water and Chemical Composition Having an Eutectic Temperature of —0.5 to Approximately —2.1 Deg. C.—Robert Henry Bedford, Prince Rupert, British Columbia, Canada. No. 2,093,069. Sept. 14, 1937.

Fat-containing Cereal Products Cooked in Water Without Addition of Salt, Subjected to Dry Heat and Elevated Temperatures, and Subsequently Salted on Surface—Harold K. Wilder and Carl W. Lindow to Kellogg Co., Battle Creek, Mich. No. 2,093,260. Sept. 14, 1937.

Ready-To-Eat Cereal Products Made by Roasting Flour-Free Bran, Cooking Bran in Moisture, and Finally Rolling Into Flake Form—Eugene H. McKay to Kellogg Co., Battle Creek, Mich. No. 2,093,285. Sept. 14, 1937.

Masses of Dough Divided Into Loaf Portions in Successive Order by Mechanical Means and Deposited Directly Upon a Moving Conveyor—Fred Marasso to Union Machinery Co., Joliet, Ill. No. 2,093,466. Sept. 21, 1937.

Bread Dough Rounder That Gives Dough Ball a Varying Rate of Climb From Around Inner Base to Top of Conical-Shaped Bowl—Charles L. Russell, Clayton, Mo. No. 2,093,621. Sept. 21, 1937.

Ice Cream and the Like Frozen in Individual Service Units to Give Product a Predetermined Final Form and a Normal Uniform Consistency—Cecil F. Dawson, Easton, Pa., to Dixie-Vortex, Chicago, Ill. No. 2,093,712. Sept. 21, 1937.

Primary and Secondary Sugar Juices From Different Stages of Sugar Cane Milling Circuits Clarified Through Decantation After Addition of Lime for Adjustment of Juice to Between pH 9.5 and 11—Ernest Edward Hartmann to Petree and Dorr Engineers, Inc., New York, N. Y. No. 2,093,759. Sept. 21, 1937.

Refined Glyceride From Fats and Oils Protected From Rancidity by Low Content of Direct Infusion of Sesame Seeds—Sidney Musher to Musher Foundation Inc., New York, N. Y. No. 2,093,971. Sept. 21, 1937.

Canned Foods Identified by Label Having a Detachable Panel—John Herbert Stansbury to National Color Printing Company Inc., Baltimore, Md. No. 2,093,985. Sept. 21, 1937.

Yeast Having High Zymatic Enzyme Content Produced By Growing In Media Containing Phytin—Alfred Pollak, Woodmere, N. Y. No. 2,094,023. Sept. 28, 1937.

Levulose Extracted From Substances Containing Invert Sugar—Robert Stephen Anthony, New York, N. Y. No. 2,094,053. Sept. 28, 1937.

Dried Fruit Mechanically Treated Under Pressure and High Speed Impact to Give Soft and Pliable State Without Breaking Outer Surfaces—Henri Daniel Rey, Papeete, Tahiti to Anglo California National Bank of San Francisco, San Francisco, Calif. Nos. 2,094,083 and 2,094,084. Sept. 28, 1937.

Dough Masses Put Into Roll Portions by Combination Dividing and Rounding Machine—Peter Blum and Franz Peter Blum, Halle-Saale, Germany. No. 2,094,289. Sept. 28, 1937.

Milk Impregnated Into Fresh Vitamin—Containing Leaves of Plants to Substitute Casein for Water Content—Dudley Howard Wiggins, Indianapolis, Ind. No. 2,094,314. Sept. 28, 1937.

Ice Cream and the Like Made by Spraying Liquid Mix in Finely Divided Form Against Refrigerated Surface; Frozen Film is Continuously Scraped Off and Forced to a Predetermined Point for Removal—Alberto Francesco Genova, Treviso, Italy. No. 2,094,394. Sept. 28, 1937.

Thought for FOOD

STERILE f. o. b.

Speaking of operations—no less sterile conditions than strictest operating room practice dictates, characterize Rossville operations from yeast culture to containers (cans, drums, tank cars). So, even though Rossville alcohol is sold to you f. o. b. distillery, freight allowed, the purity is always f. o. b. your plant.

Mailed Free "ALCOHOL TALKS"—A monthly educational series on alcohol.

A LASS and a LACquer

An advertising lassie asks which should be the more attractive: the package *containing* the product or the display material *advertising* the product. Well, you first have to sell customers through the display material before they take on the product . . . Lacquered displays infer appetizing freshness, have longer counter life and permit dramatizing the lacquered package.

Send for elaborate portfolio entitled "LACQUER COATING FOR MODERN MERCHANDISING."

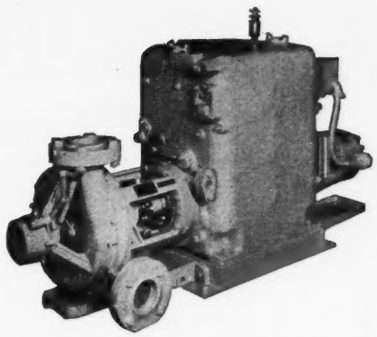
OPEN SESAME

"Is there a strong man in the house?" demands the hostess when the cap on the catsup (or any other sup) bottle refuses to turn.

That's always a sign that the manufacturer hasn't heard of Resinox . . . for the threads on the inside of Resinox caps, though molded, have the smoothness of precision machining and the knurling on the outside is so deeply cut that even slippery fingers get a snug grip.

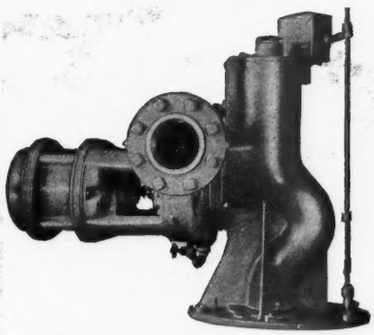
An instructive book containing data on molded closures is yours for the asking.

COMMERCIAL SOLVENTS CORPORATION
New York Central Building, New York, N. Y.



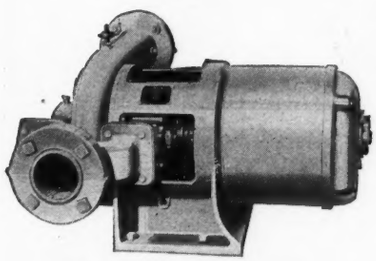
JENNINGS VACUUM HEATING PUMP

Vapor Turbine type above requires no electric current. Efficiently handles air and condensate from return line heating system, promoting high operating efficiency.



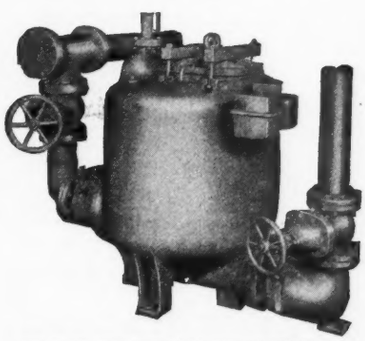
JENNINGS SUMP & SEWAGE PUMPS
PEDESTAL TYPE

Mounted entirely above the pit cover. Entirely self-priming. All working parts high and dry. Only suction pipe submerged. Economical.



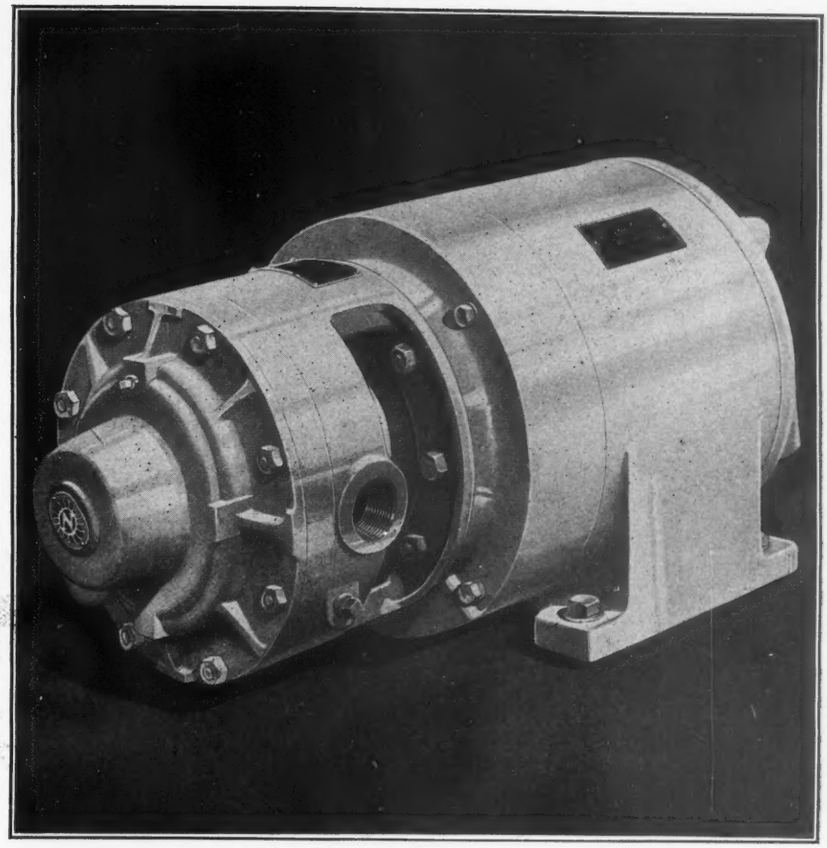
CENTRIFUGAL PUMPS
STANDARD AND SELF-PRIMING

Motor armature and pump impeller mounted on same shaft. No bearings in pump casing. One stuffing box. Simple, compact, reliable.



JENNINGS SEWAGE EJECTOR

Most efficient device for pumping unscreened sewage from low levels, or pumping any heavy liquid with large proportions of solids.



Nash Clean Air Compressor. Delivers only clean air, free from dust, heat or oil. One moving part. No pistons or sliding vanes. No internal lubrication. Ask for Bulletin 236.

THERE IS A NASH
For Every Pumping Service

PERFORMANCE, QUALITY and SERVICE are the three fundamental reasons for the many thousands of successful installations of Nash Pumps.

PERFORMANCE is made positive by the most advanced ideas in Engineering Research, checked by individual performance tests on each and every pump.

QUALITY is maintained by the careful selection of the finest materials, fabricated by superior workmen under constant and rigid inspection.

SERVICE is assured by the resources and reputation of the Nash Engineering Company, and backed by a nation-wide network of sales and service offices.

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SOUTH NORWALK, CONNECTICUT, U. S. A.

Let Shriver Experience Solve Your Filtration Problems

See Our Filtered Food Products Exhibit at the Chemical Exposition

T. SHRIVER & CO., 860 Hamilton St., Harrison, N. J.

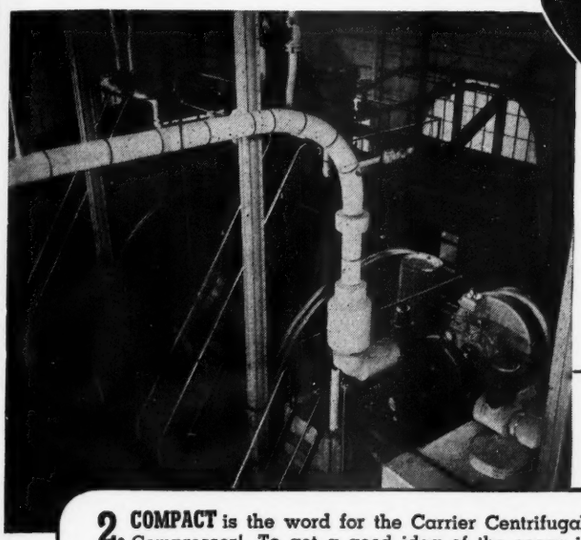
HEAT BALANCE IMPROVED—

Operating and Investment Cost Reduced

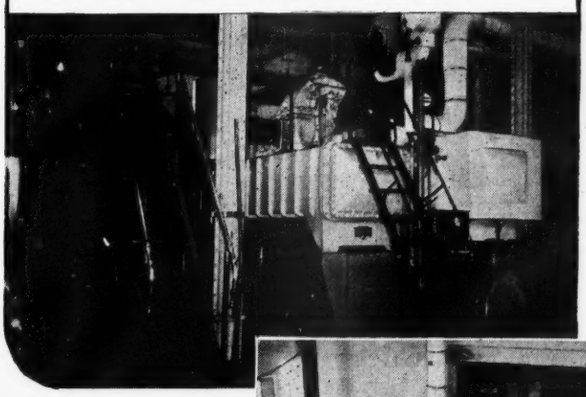
WITH

Carrier Centrifugal REFRIGERATION

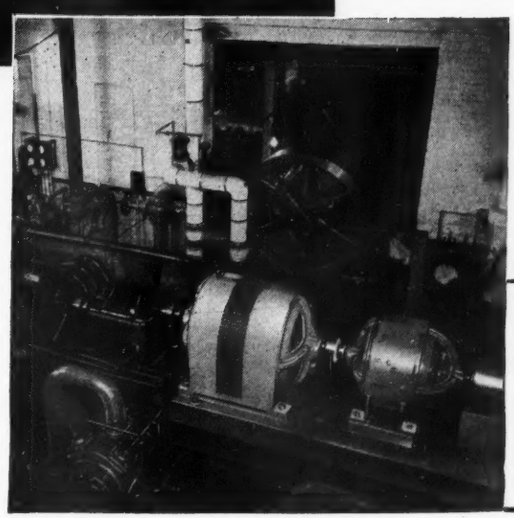
1. SIMPLE! No electric drive reciprocating machine is necessary here! A simple steam turbine, using live steam from the boilers, provides direct drive for the Carrier Centrifugal Compressor, and eliminates losses due to electric power generation and transmission. Clean and untainted from oil, the exhaust steam is used in processing.



2. COMPACT is the word for the Carrier Centrifugal Compressor! To get a good idea of the space it requires, compare this picture with the one preceding, showing the reciprocating machine it replaces.



3. LOW POWER COSTS throughout the plant are assured with a set-up like this—and it's all a part of the heat balance made possible by Carrier Centrifugal Refrigeration. Only a fraction of the size of the equipment it replaces, this mixed pressure bleeder, type turbine and dual generator unit supplies both AC and DC power, and also provides clean exhaust steam for processing. Why install large, costly generators — when smaller ones supply all the electric power required, more efficiently — more economically?



Direct Drive Makes Costly Generators Unnecessary for Refrigeration at Narragansett Brewing Company

Makes Savings with Reduced Investment

THE installation of steam turbine driven Carrier Centrifugal Refrigeration in this Providence, R. I. brewery is a good example of the economies that can be secured wherever refrigeration is required—for processing or for air conditioning.

First of all, the investment cost is definitely lower—for no electric driven reciprocating machines are necessary, and the size of generators required for plant power is greatly reduced.

Second, the system makes full use of all steam—for the exhaust steam is clean and free from oil and can be used for all plant processing. This feature made it unnecessary for the Narragansett Brewing Company to enlarge its existing boiler capacity.

Lastly, the system requires less space and less attention. Using a low pressure harmless refrigerant, the Carrier Centrifugal operates at conservative speeds, picks up loads almost instantly, and meets all varying load conditions. A minimum of moving parts insures long, trouble-free service.

An interesting new booklet tells more of the features of direct drive Carrier Centrifugal Refrigeration—send for it.

CARRIER CORPORATION, Desk 906
Syracuse, New York

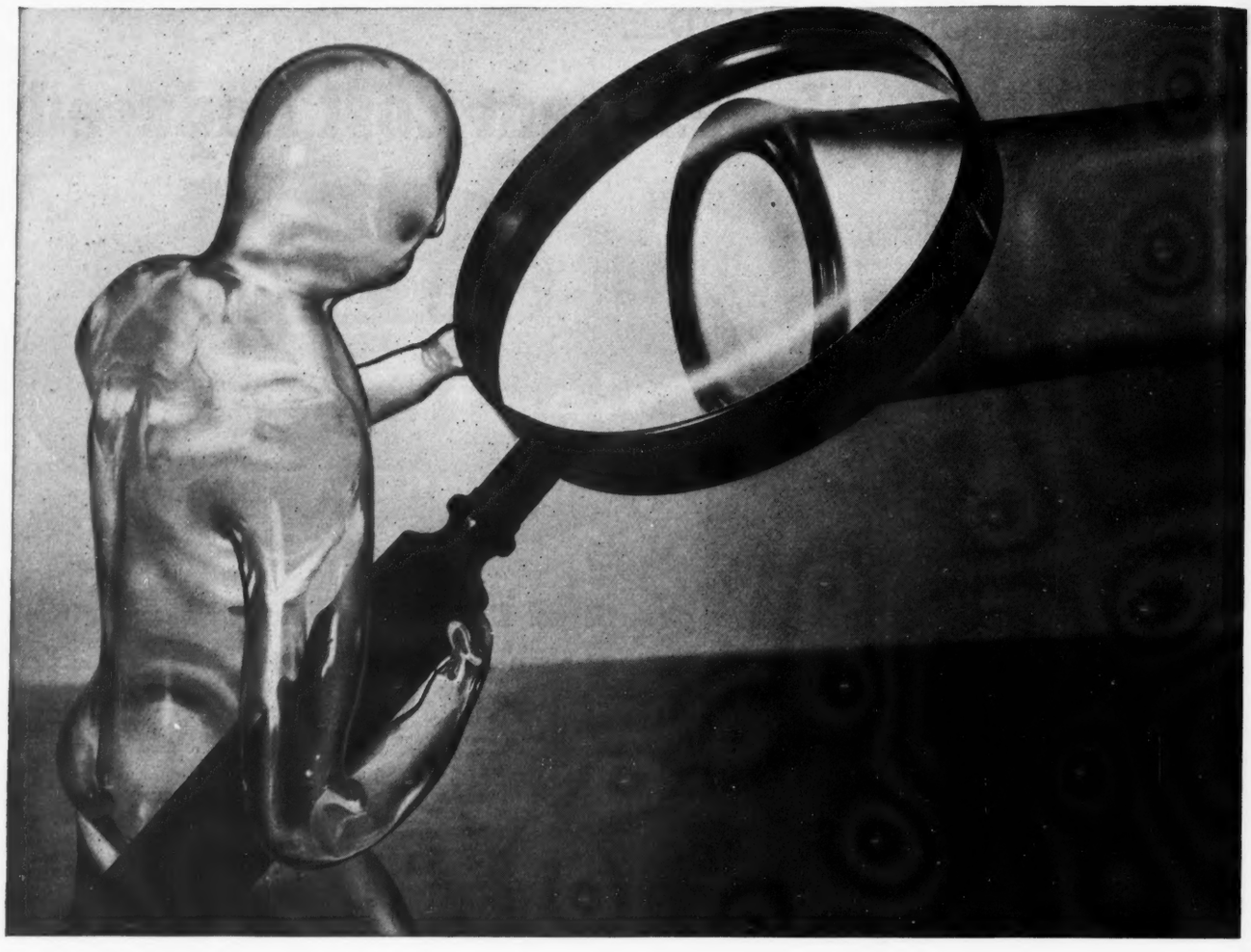
Without obligation, send me free copy of your booklet, "Carrier Centrifugal Refrigeration—for New Plants, for Additions, for Replacements."

Name ..... Title .....

Company .....

Address .....

City .....



Clean BECAUSE IT'S FLUSHED WITH STEAM

"PYREX" Brand Glass Pipe Lines are the answer to many problems of the packing industry. The resistance of "PYREX" Brand Chemical Glass to thermal shock permits flushing of pipe lines with steam or hot water. Greater mechanical strength and hardness insures the long life that makes "PYREX" Brand Glass so economical. Transparency enables better product control through more accurate and frequent checking. Remarkable resistance to acids and alkalies in solution (except concentrated HF) assures freedom from corrosion and contamination.

Profit wise canners eliminate pipe-line problems by installing "PYREX" Piping.

• Use "Pyrex" Piping as insurance against corrosion. Its long life and ultimate economy will amply repay you.

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"PYREX" is a registered trade-mark and indicates manufacture by Corning Glass Works

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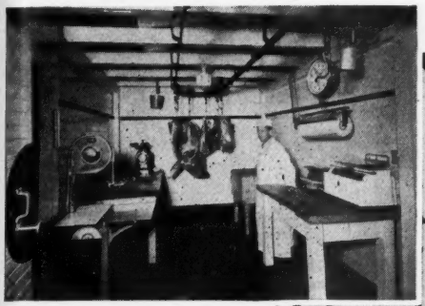
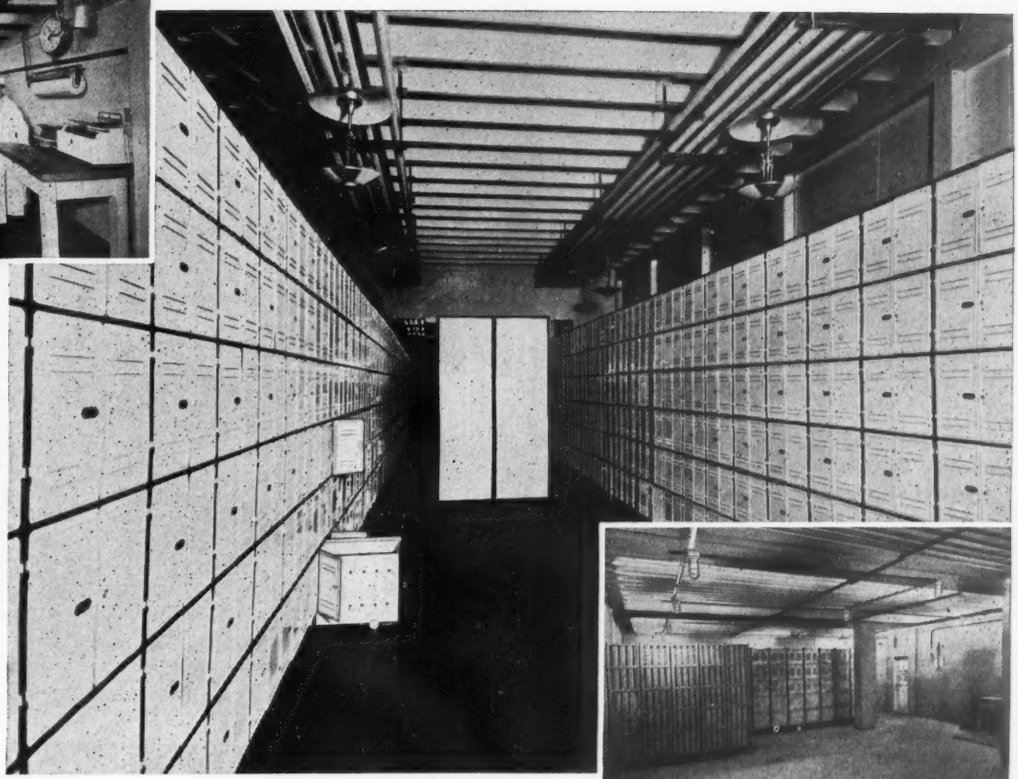
CORNING *means* Research in Glass

GLASS REVEALS BOTH ITS MAKE-UP AND ITS CONTENTS

Let Armstrong help you plan

COLD STORAGE LOCKER ROOMS





Cutting room (above) where meats are prepared for freezing and storage in the refrigerated locker room (right) in the plant of the Columbus Ice and Storage Company, Columbus, Kansas. Photographs courtesy Master Refrigerated Locker Systems, Inc., Sioux City, Ia.

Cold storage locker room in the Armstrong insulated plant of L. L. Coryell & Son, Lincoln, Nebraska.

FROM PLAN TO FINISHED JOB *Armstrong's* EXPERIENCE CAN HELP YOU BUILD EFFICIENTLY, SAVE MONEY . . .

MANY owners of cold storage plants are considering the addition of refrigerated locker rooms. Such units offer a source of year-round income, an added supply of customers for products on sale, and an extra return on the investment in refrigerating equipment. Locker storage plants are being operated successfully as independent businesses and in connection with creamery or dairy plants, ice plants, grocery stores, retail meat shops, and other established businesses.

Owners of refrigeration plants who are interested in locker storages or persons considering an independent plant, are invited to avail themselves of the experience Armstrong has to offer in this field. Armstrong engineers have worked closely in the planning of many profitable locker storages. They are familiar with the requirements for practical and economical layouts. They can recommend construction and insulation methods, based on over thirty years of experience.

Proper insulation is a prime necessity in locker storages, as in all low temperature plants. For economical operation, and long, efficient service, you can depend on Armstrong's Corkboard. Because of cork's natural cellular structure, this insulation remains efficient through years of service.

~ ~ ~

Armstrong Contract Service

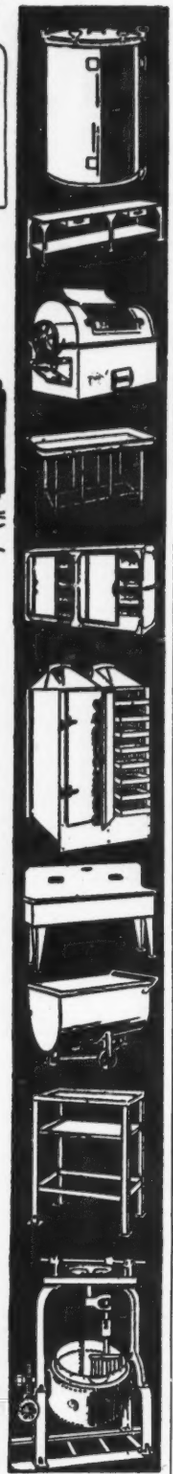
Armstrong maintains a Contract Department to install corkboard and cork covering in accordance with Armstrong specifications. This service enables owners to centralize responsibility for both the insulation material and its installation, thus assuring a satisfactory job.

Let Armstrong engineers work with you on your next insulation job—whether cold storage locker room or any other work involving low temperature control. Write today for complete details to Armstrong Cork Products Company, Building Materials Division, 948 Concord Street, Lancaster, Pennsylvania.

Armstrong's CORKBOARD INSULATION

HAVE YOU A "WEAK SISTER" IN YOUR PRODUCTION SET-UP?

PRODUCTION WAS FINE 'TIL IT REACHED YOUR DIVISION, THEN OUR SCHEDULE WENT TO PIECES
AND I'LL TELL YOU WHY! IT'S THAT OLD INEFFICIENT EQUIPMENT...IT'S CONTINUALLY FALLING DOWN ON THE JOB



Your profits depend to a great extent on successfully meeting production schedules. When you find any part of your equipment unable to operate at its best it's time for replacement. The reasons are simple. Inefficient equipment breaks down, needs repair, uses up valuable man-hours, creates spoilage by tainting and discoloring your products and in the final analysis eats up the profit you should have made.

Why not rectify this condition immediately? Call in a KOVEN engineer. Let him show you how *"KOVEN-IZING" your plant with modern, efficient equipment, built to your specifications from all commercial, corrosion resisting metals and alloys will quickly and surely help you obtain the legitimate profits to which you are entitled.

*"KOVEN-IZING" means efficient industrial equipment built to specifications.

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Galvanizing Work
Kettles, All Types, All Metals
Mixers, All Kinds
Monel Metal Fabricator
Pails, Special Heavy
Pans, All Types, All Metals
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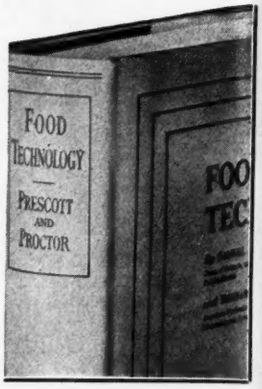
Your name stamped on this book FREE



At no additional cost to you, we will stamp your name, or a friend's name in gold on the front cover of any copy of Prescott and Proctor's *Food Technology* ordered from this advertisement. This is a special Christmas offer, limited to acceptance before January 1, 1938.

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Food Technology

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and BERNARD F. PROCTOR

Associate Professor of Food Technology and Industrial Biology
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630 *pages*, 6 x 9, 70 *illustrations*, $5.00

"THE great food industries, taking advantage of scientific research and discovery, and operating under conditions of sanitary and economic control, are in reality great laboratories conducted with high standards of quality and efficiency of operation," say these authors. Their book describes these conditions, outlines these methods, for the guidance of all branches of the food industry.

Special features of the work are the emphasis on biological and technological chemistry and the sound treatment of such processes as refrigeration, canning, dairy products, quick freezing, etc. The book covers a range of material never before included in one compact volume.

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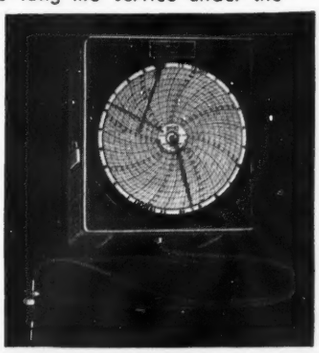

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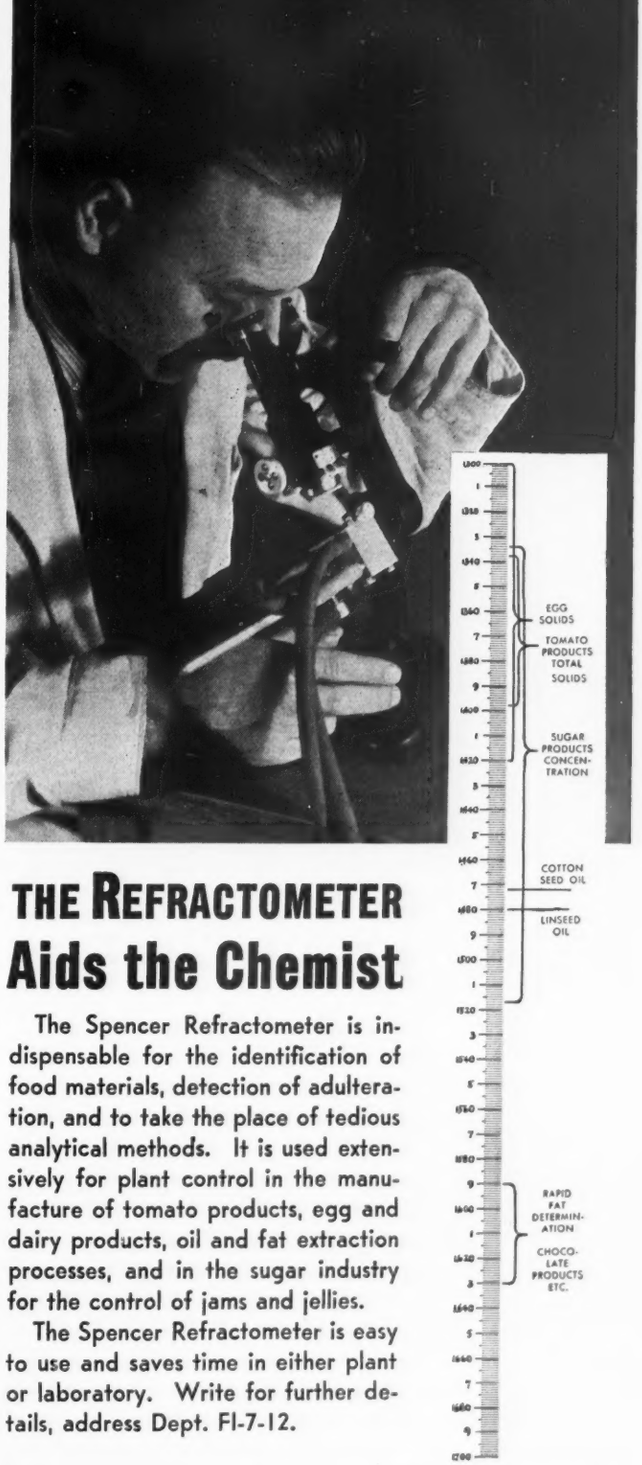
With Speed and Accuracy



THE REFRACTOMETER Aids the Chemist

The Spencer Refractometer is indispensable for the identification of food materials, detection of adulteration, and to take the place of tedious analytical methods. It is used extensively for plant control in the manufacture of tomato products, egg and dairy products, oil and fat extraction processes, and in the sugar industry for the control of jams and jellies.

The Spencer Refractometer is easy to use and saves time in either plant or laboratory. Write for further details, address Dept. FI-7-12.

Spencer Lens Company
Buffalo (SPENCER BUFFALO U.S.A.) New York

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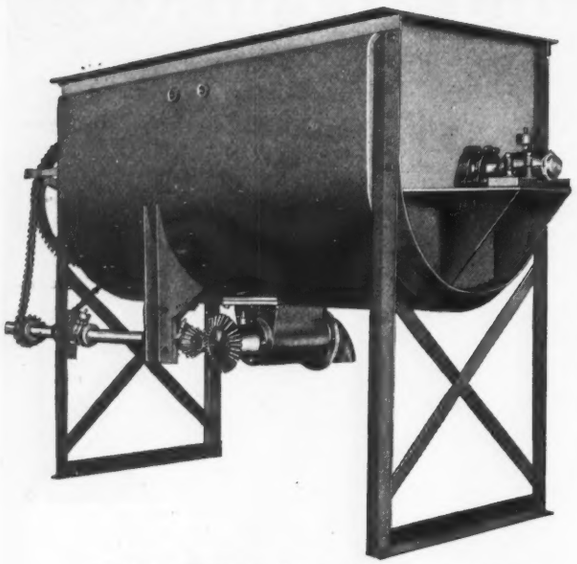
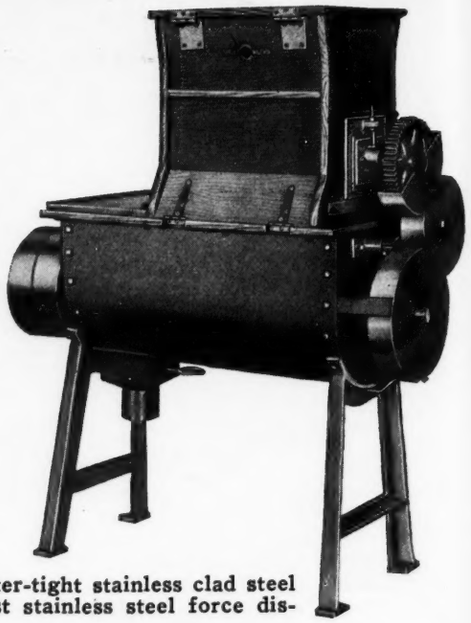
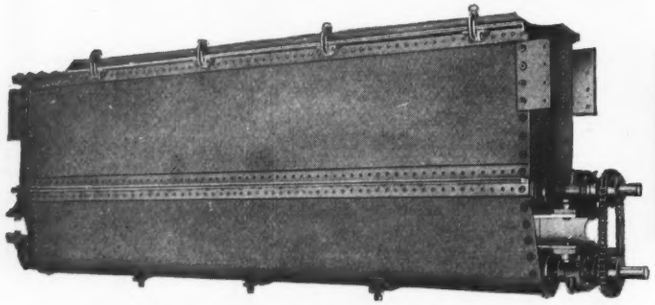


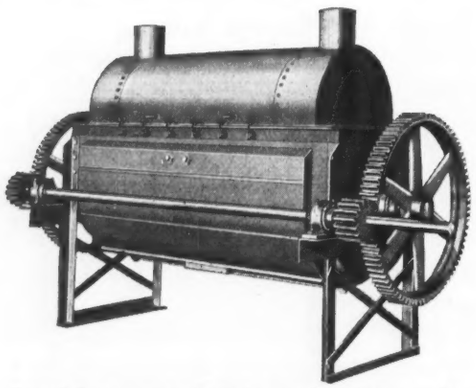
A special porcelain-lined sifter and mixer of small capacity.



A jacketed water-tight stainless clad steel mixer with cast stainless steel force discharge.



A special non-corrosive mixer for mixing a semi-liquid product, cast aluminum ends, galvanized agitator, Allegheny metal case.



Special steam jacketed cooking mixer with vented dome.

MIXERS

Then you will want to know more about the custom built, aluminum, stainless steel, nickel clad, porcelain-lined, wood or steel types made by Sprout-Waldron for the food industry.

Our experience will prove valuable to you in choosing a mixer best suited to your process. Just tell us your problem and we will submit our recommendations without obligation to you.

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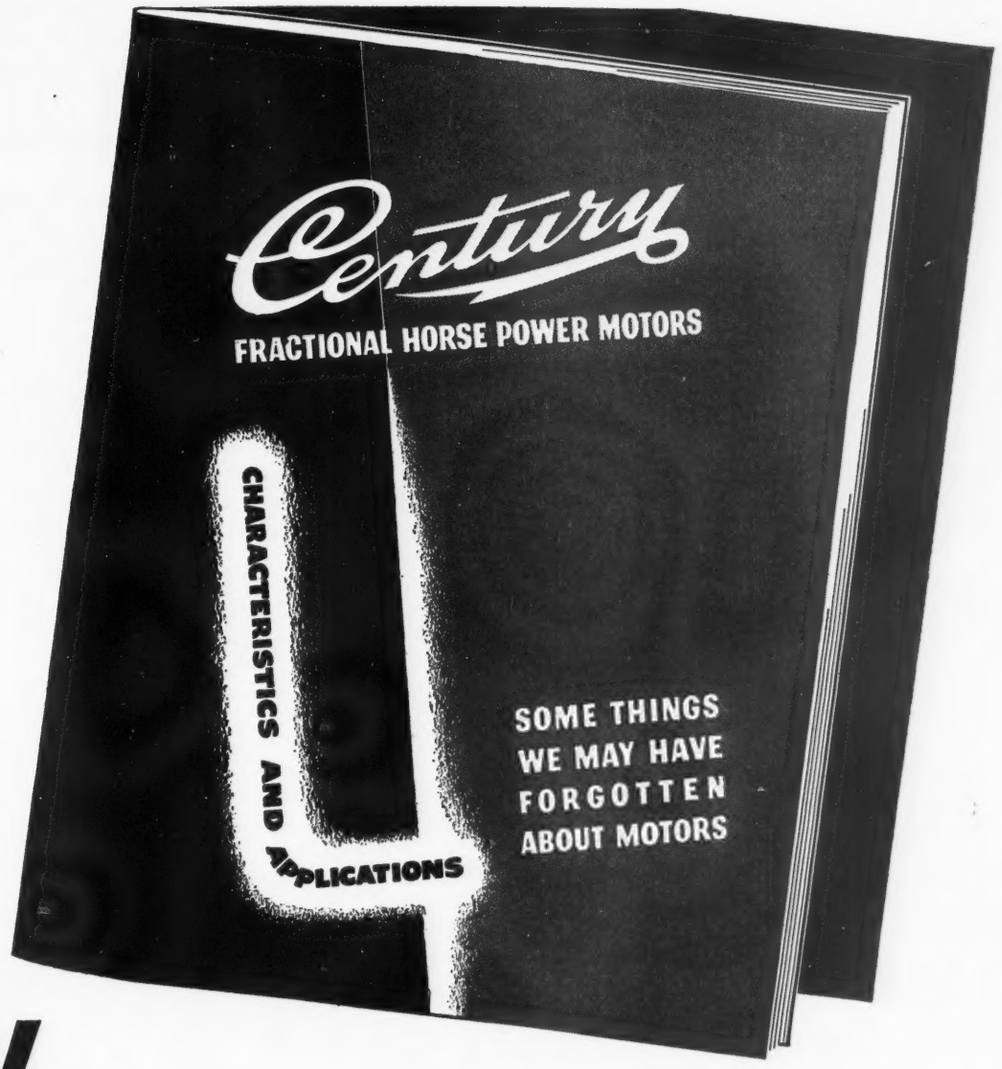
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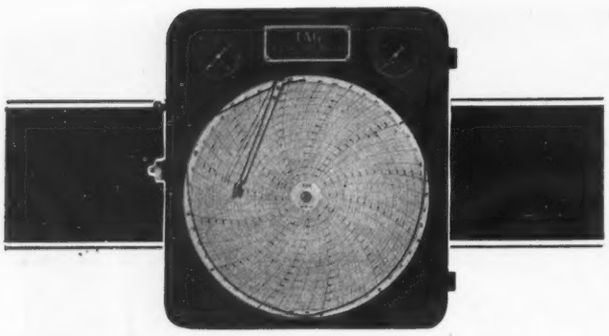

$ave time — $top waste — $ave process costs with

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WHAT IT DOES
WHAT IT COSTS

At every point in the handling, processing and storing of food products, TAG Automatic Control limits spoilage to the barest minimum, assures the retention of natural, delectable flavors and shortens cooking schedules to the precise control points which fix real processing economy and excellence of product. With TAG's complete instrumentation in charge of your retorts and kettles, you automatically maintain temperatures at your control points and gain unbroken, written records of your entire cook.

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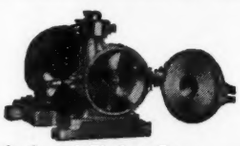

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Miller Anode Canners' Gloves don't tire hands because their full molded design gives form fit without binding. A special "Rub-X" finish on their inside surface adds to wearing comfort. "Sure Grip" reinforcements speed up handling of wet and slippery articles.

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Miller White Anode Canners' Gloves are available in sizes and half sizes from 6½ to 11 inclusive. All are 11" in overall length and have rolled edge cuffs.

Call your local jobber for sample and prices or write . . . .

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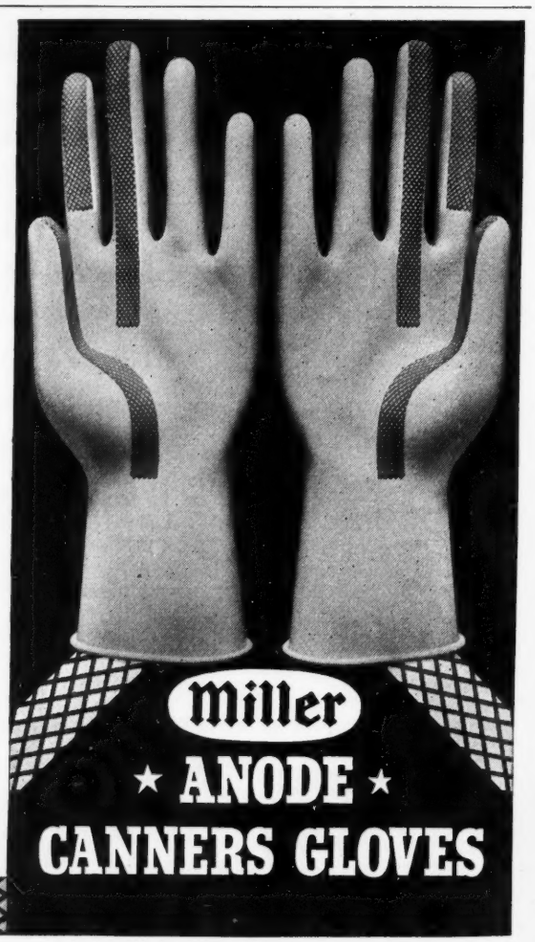
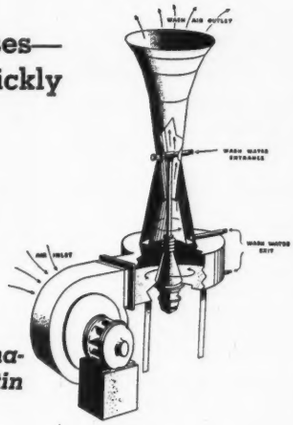


Remove Dust Solids

and soluble gases—
thoroughly—quickly

Bowen Venturi Washer, Scrubber, Concentrator, and Absorber



For detailed explanation write for Bulletin No. 4.

BOWEN
RESEARCH CORPORATION
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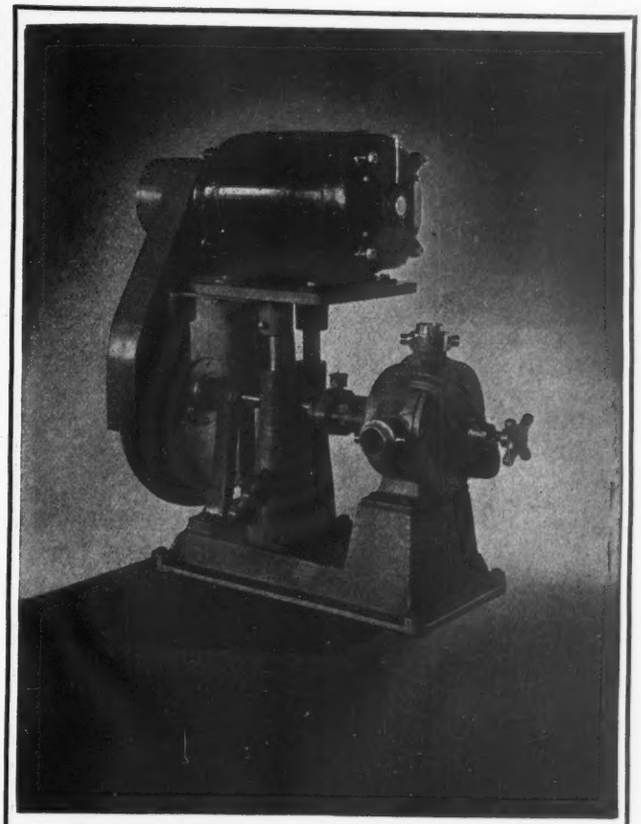
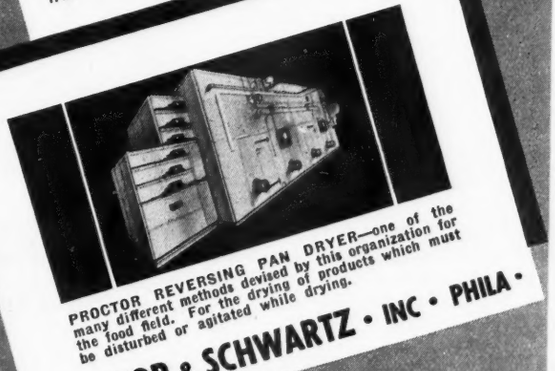


PROCTOR DRYERS

Because of the unparalleled experience of the Proctor & Schwartz organization in designing and building dryers for large food manufacturers, Proctor Machines are recognized as the most highly efficient drying equipment from every standpoint . . . they offer greater hourly output, lower cost operation, less steam consumption, trouble-free operation, and a much higher quality of results.



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PROCTOR & SCHWARTZ • INC • PHILA•

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Here is the immediate solution to many of your rotary pumping problems . . . the NEW variable speed, variable capacity VIKING ROTARY PUMP.

By merely turning a hand wheel, the capacity of a 35 GPM pump can be changed, while still running, from 17 to 42 GPM.

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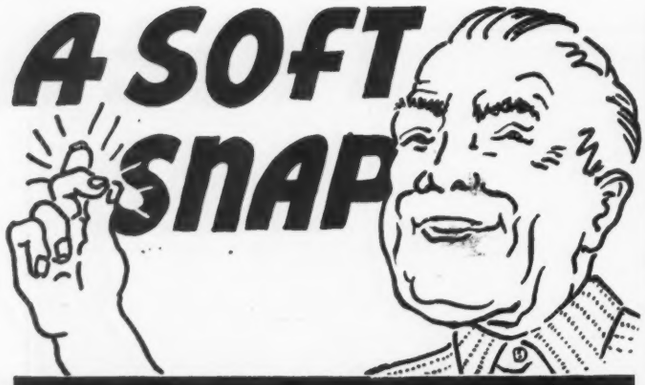


Cleaning with METSO

AND TAKE THE WORD of men who use Metso daily. The Metso cleaning solution removes stubborn dirt and grease and lifts them out of crevices and seams in a jiffy.

It's the active alkali plus the silica in Metso that works so thoroughly and quickly. The silica also acts as a protector of sensitive metal surfaces.

Let us send you a sample of free flowing, quick dissolving Metso for trial. Convince yourself of the greater ease with which complete cleaning can be done in your plant.

PHILADELPHIA QUARTZ CO.
General Offices & Laboratory: 125 S. Third St., Philadelphia.
Chicago Sales Office: Engineering Bldg. Stocks in 60 cities.

METSO CLEANERS

Inexpensive

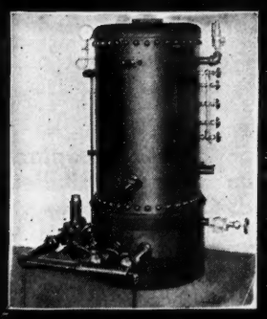
YET IT HAS MANY FEATURES USUALLY FOUND ONLY IN FAR MORE COSTLY STEAM BOILERS

GAS FIRED
MKAYO

Our economical version of a considerably more expensive boiler, the MKAYO Type "M" meets the demand for a popular priced, yet reliable and efficient gas fired boiler suitable for many services. It is highly recommended wherever an unjacketed boiler can be used and wherever a small (1 to 5 H.P.) boiler is required.

Details of construction and operating data are yours to examine; just write us, today. No obligation.

Ask, too, about the famous KANE and OFELDT boilers—and the M. K. O. Boiler Feed.



Fully Automatic

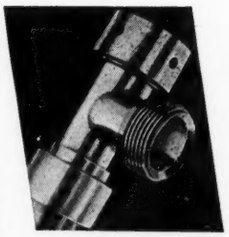
MEARS-KANE-OFELDT INC.

Executive Offices and Factory
1903-1915 EAST HAGERT ST., PHILADELPHIA
Branch Offices or Distributors in Principal Cities

In Food Handling Especially STAINLESS STEEL TUBING *calls for* STAINLESS STEEL FITTINGS

No Soldering—No Welding—No Flanging

On Stainless Steel Tubing, only Stainless Steel Fittings will make a perfect joint. Wallace patented 18-8 stainless steel fittings, with the specially designed Wallace ferrule, can be attached in a moment. No welding, no flanging, no soldering, no weakening. Fabricated, not cast. Polished inside and out. Sanitary. Good looking. Permanent. Costs are moderate. Write for circular, using the coupon below.

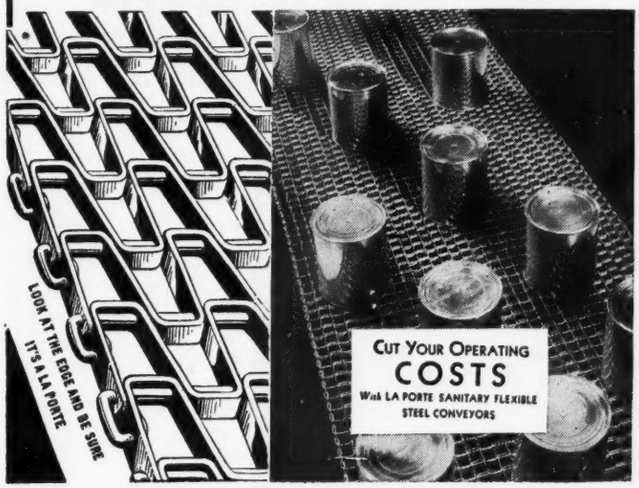


PITTSBURGH STAINLESS STEEL FITTINGS CO.
7501 Thomas Blvd., Pittsburgh, Pa.
Please mail me descriptive circular on your Stainless Steel Fittings for 18-8 Tubing.

Name.....

Address.....

You get **LONGER WEAR** with **LESS REPAIR** in **LA PORTE** Flexible Steel Conveyor Belting.



This revolutionary improvement in conveyor belting is setting NEW STANDARDS of dependable and Economical Trouble-Free Service on sorting, peeling, grading, and picking tables, in drying, and spraying conveyors.

Provides a flat surface for conveying cans, bottles, and boxes, empty or filled. Will not creep, weave, or jump on friction drums, nor wear edges and pulley stand. Uniformly strong at all points. Resists wear—will not shrink nor stretch. Heat, acid, and corrosion resistant. It will cut your operating costs, speed up production and eliminate costly break-downs.

See your Mill Supply House—if they can't supply you, write us direct TODAY for full details and prices.

LA PORTE FLEXIBLE LONG WEARING STEEL CONVEYOR BELTS

LA PORTE MAT & MFG. CO.
305 BRIGHTON STREET • LA PORTE, INDIANA

Have You - -

a place in your organization for a young sales executive who has proven successful in developing profitable merchandising and advertising ideas; has efficiently organized, operated, and built sales forces; has had excellent business experience in wholesale and chain store distribution, and has a large valuable acquaintance among the food and confectionery buyers, the chain stores, and wholesalers; experienced in conducting advertising and specialty work campaigns; hard worker, applies force, initiative, ingenuity, purpose, and action. Has held sales executive position with large food manufacturer, now desires a change in connection with manufacturer who offers opportunity for a producer. Experienced in food products, cookies, crackers, and confections. Will furnish the very finest references.

SA 333 FOOD INDUSTRIES
520 No. Michigan Ave. Chicago, Ill.

IT PAYS to use the BEST!

ONLY HOWE PORTABLE SCALES HAVE BALL-PROTECTED BEARINGS

Profits melt and costs multiply according to the accuracy or inaccuracy of your weighing equipment.

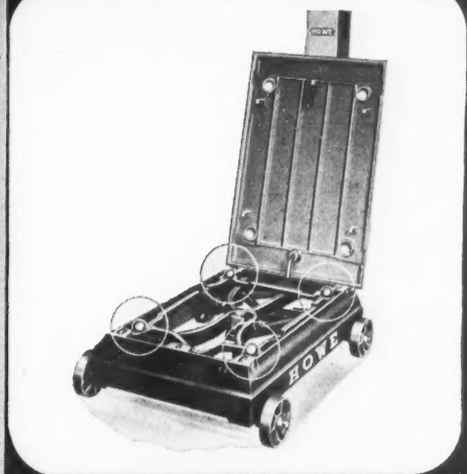
To guard against profit leaks, to increase production speed, and to cut maintenance costs use portable scales with Ball-Protected Bearings — HOWE Scales.

Built for hard use, HOWE Portable Scales outwear and out-perform all other scales—give you more for your money in weighing satisfaction and continuous service.

Just lift up the platform of a HOWE Portable Scale. See for yourself why it is better! Four specially hardened ball-bearings set between the platform and the scale knife edge bearings give protection to the knife edges — assure longer periods of sustained accuracy. HOWE makes Portable Scales for every weighing requirement from 500 to 10,000 lb. capacities.

For complete information, write, wire or telephone our nearest branch, or The Howe Scale Company, Dept. F-12 Rutland, Vermont.

HOWE Scales
HOWE FAMOUS FIRST IN 1857

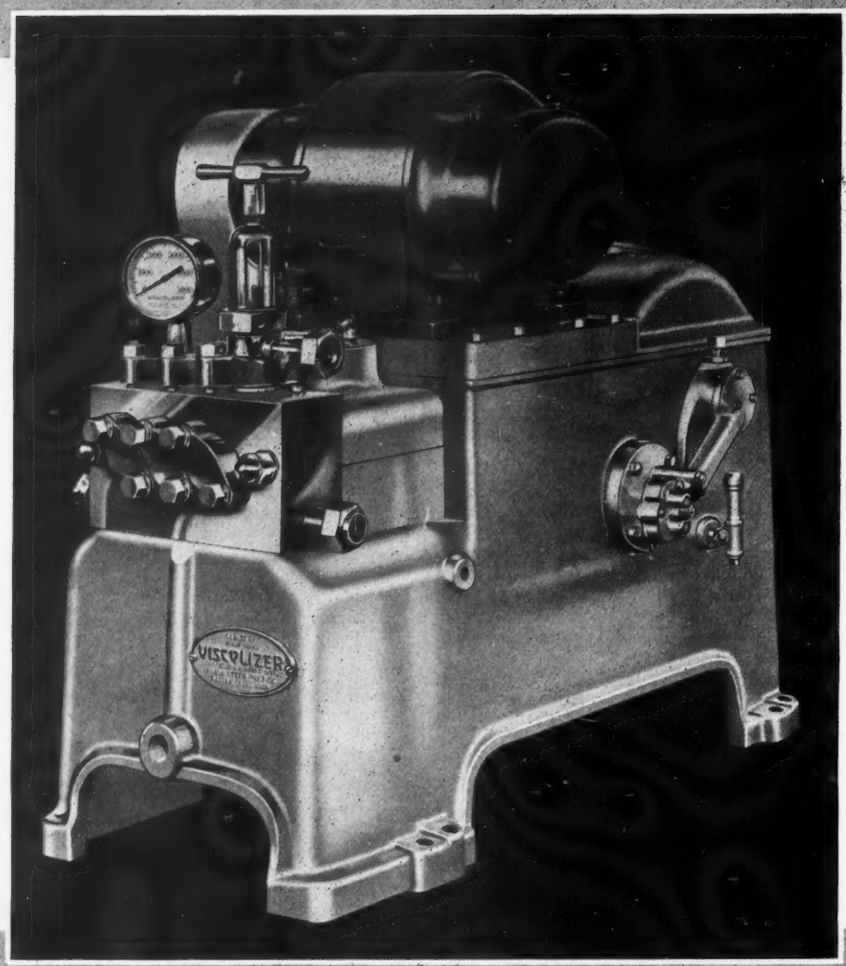


HOWE Scales
FOR THE FOOD INDUSTRIES

Hopper	Weigh-Can
Tank	Dial
Railway track	Suspension
Motor truck	Counter platform
Warehouse	Canning
Sacking	Balance Indicators
Portable platform	Weightographs

THE HOWE SCALE COMPANY
Rutland, Vt.

More Sanitary Features *You'll Like*



The NEW IMPROVED SANITARY VISCOLIZER

ABOVE you see the latest improved model of the Sanitary Viscolizer which was shown for the first time at the Dairy Industries Exposition in New Orleans.

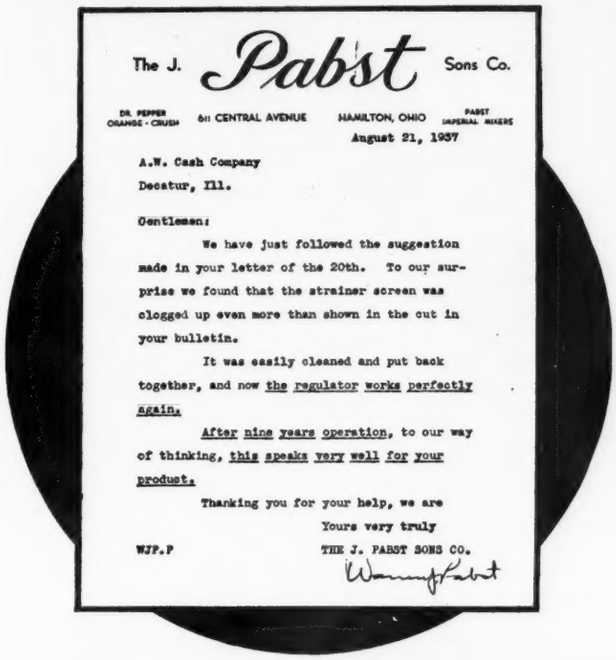
This new 1938 model has many important improvements that will appeal to every milk plant or ice cream plant operator. Of first importance is the new Duo Visco Valve in which the plunger pin packing has been replaced with the popular "single-seal" packing—and in which all internal threads have been eliminated. Then there is the elimination of all dead ends in the solid stainless steel block. Also the plunger passages in the block have been machined to a smooth glass-like finish.

Another improvement you'll note is the opening up of the base at the bottom to facilitate cleaning underneath the machine. The stainless steel plunger rods and stainless steel packing glands are retained — completely accessible for cleaning. Easy to clean and keep clean this Improved Sanitary Viscolizer makes the viscolization of milk, ice cream mix, condensed milk and many other food products just as practicable as it is desirable.

Write for full details today!

CHERRY-BURRELL CORPORATION 427 W. RANDOLPH ST., CHICAGO

After 9 Years' Service



The J. Pabst Sons Co.

DR. PEPPER ORANGE-CRUSH — 611 CENTRAL AVENUE — HAMILTON, OHIO — PABST IMPERIAL MIXERS

August 21, 1937

A.W. Cash Company
Decatur, Ill.

Gentlemen:

We have just followed the suggestion made in your letter of the 20th. To our surprise we found that the strainer screen was clogged up even more than shown in the cut in your bulletin.

It was easily cleaned and put back together, and now the regulator works perfectly again.

After nine years operation, to our way of thinking, this speaks very well for your product.

Thanking you for your help, we are

Yours very truly

WJP.P — THE J. PABST SONS CO.

Wm. J. Pabst

All It Needed Was Cleaning!

The letter tells the story . . . and it's typical of the experience of Cash Standard valve users. After 9 years' continuous use, this Class D Valve simply needed cleaning.

Quickly and Easily Done

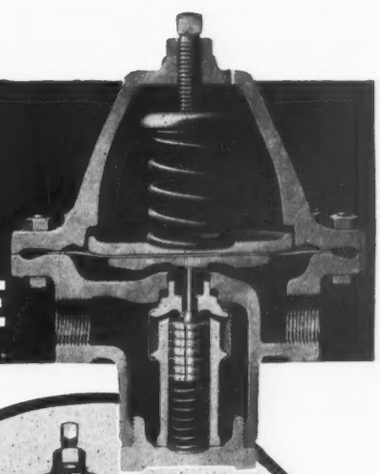
No removing the valve or dismantling it. No readjustment or testing. The working unit was simply removed by one of the plant's own men, the screen cleaned, and then replaced.

Worked Perfectly Again

There's proof of durability, simplicity, and low maintenance cost! Cash Standard Class D Pressure Reducing Valve avoids binding and sticking. Simplicity, strength and trouble-free service are apparent from this cut-out view.

CASH STANDARD

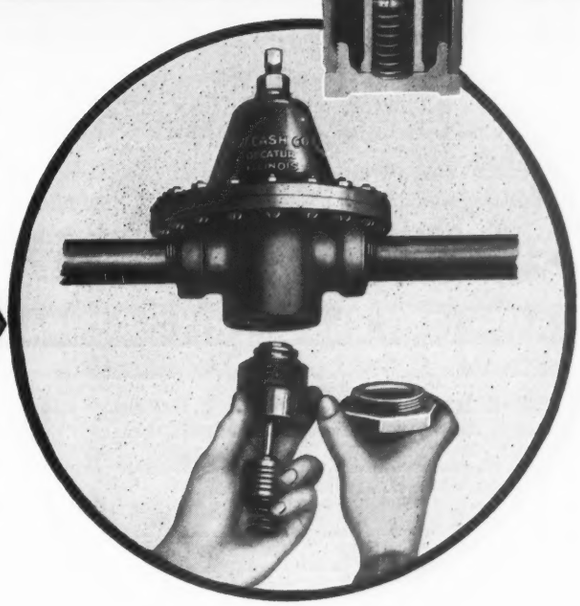
CLASS D PRESSURE REDUCING VALVE



A Cure for "IDLE MEN"

Long delays—production at a standstill while valves are removed, repaired, and replaced—or sent back to the manufacturer for repair . . . you avoid all this with the installation of the Cash Standard Class D Valve with

CARTRIDGE TYPE WORKING UNIT



Unscrew the bottom closing cap, remove the complete assembly . . . cylinder, piston and all. Replace it as simply. Any man can do it—saving hours of time when time counts. By replacing with an inexpensive renewal unit, if necessary, the valve is good as new. There's a lot more to say about this Class D Valve. Write and we'll send the complete bulletin.

A. W. CASH COMPANY, DECATUR, ILLINOIS

The odds are 98 to 1 a standard LO-HED Hoist will meet your MHP*

- Although your particular "M H P" (*Materials Handling Problem) may be distinctly different from the handling problems of other companies—you will save money if you can use *standard* hoists.
- Your chances are 98 to 1 that a *standard* A-E-CO Lo-Hed HOIST will prove to be perfectly suited to your needs.
- Why? Because there are 98 *standard* models of A-E-CO Lo-Hed HOISTS—models for *every* purpose, and in a wide range of capacities, speeds and types.
- Our new catalog clearly shows you how to select *the* hoist for *your* job. Send for it!

A-E-CO LO-HED HOISTS

AMERICAN ENGINEERING COMPANY

AMERICAN ENGINEERING COMPANY
2455 Aramingo Avenue, Philadelphia, Penna.

Gentlemen: Please send me your complete new catalog showing how to select a LO-HED hoist.

*Name of Company*_____

*Company Address*_____

*Your Name*_____

*Your Title*_____

Other Products: A-E-CO Taylor Stokers, A-E-CO Hele-Shaw Pumps, Motors and Transmissions, A-E-CO Marine and Yacht Auxiliaries.

STOPS OVERHEATED WATER

Reduces Fuel Losses

POWERS Hot Water Tank Regulator

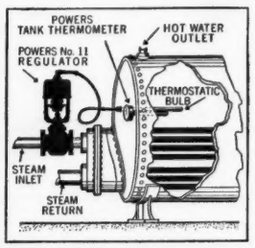
Ends Hot Water Complaints

Pays back its cost several times a year

OVERHEATED water causes complaints, wastes fuel — shortens life of valves and plumbing fixtures and increases deposit of lime in pipes. • Powers regulators will help to reduce these losses. Install them on your hot water heaters. They keep the water at the right temperature. Fuel savings alone often pay back their cost several times a year. As they usually last 10 to 15 years they pay big dividends. *Write for Bulletin 2035.*

The Powers Regulator Co. Offices in 45 Cities. See your phone directory. 2755 Greenview Avenue, Chicago; 231 E. 46th Street, New York City; 1808 West 8th Street, Los Angeles.

45 *Years of Temperature Control*



POWERS
AUTOMATIC
WATER TEMPERATURE CONTROL

IF YOU HAVE

A PACKAGING PROBLEM

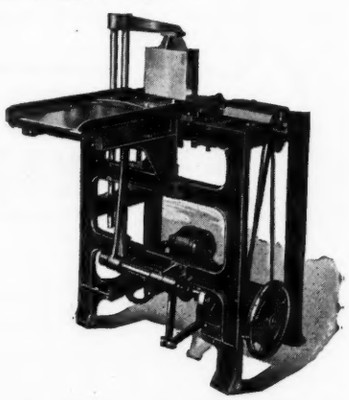
Investigate PETERS Automatic Carton Packaging Machines which are used extensively for setting-up and closing packages.

Right: JUNIOR CARTON FORMING AND LINING MACHINE . . . This machine sets up 35-40 cartons per minute, requires only one operator and is adjustable for a wide range of sizes.

Also available . . . JUNIOR CARTON FOLDING AND CLOSING MACHINE to close 35-40 cartons per minute, requiring no operator. This machine is also adjustable for a wide range of sizes.

Where larger production is required, SENIOR Machines are installed, both for setting up and closing cartons automatically.

Send your problem to us and we will be pleased to send you complete information on machines to handle it efficiently and economically.



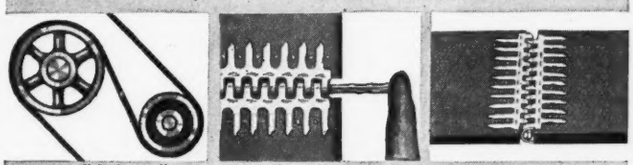
PETERS MACHINERY COMPANY
4700 RAVENSWOOD AVENUE
CHICAGO . . . . . ILLINOIS
BRAMIGK & CO., LTD. . . . LONDON, ENGLAND

ALLIGATOR

TRADE MARK REG. U.S. PAT. OFFICE

STEEL BELT LACING

The compression grip protects belt ends. Made with precision. Drives straight. Smooth on both faces. Embeds in belt.



For all belts—all speeds. Flexible. Rocker Hinge Pin. Separable joint. Great strength. Long life.

"Never Lets Go"

Made also in "Monel Metal" and non-magnetic alloy for special service, and in long lengths for wider belts.

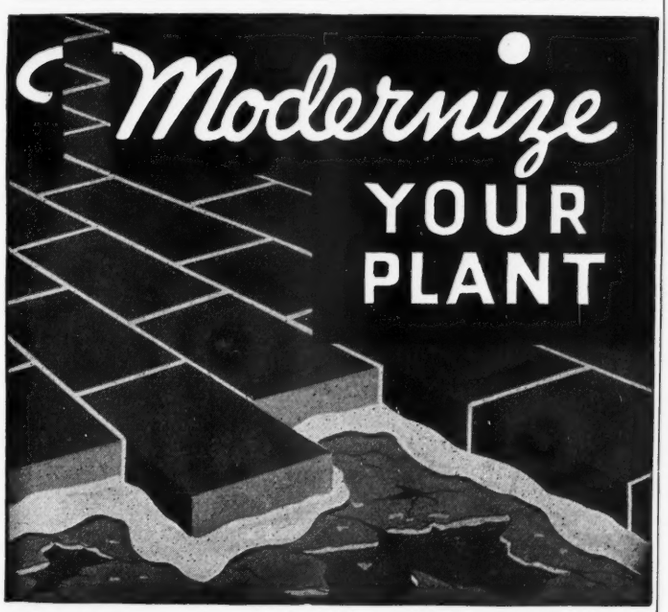
Sole Manufacturers

FLEXIBLE STEEL LACING CO.

4612 Lexington Street Chicago, Illinois

In England at 135 Finsbury Pavement, London, E. C. 2

12 Sizes in Standard Boxes.



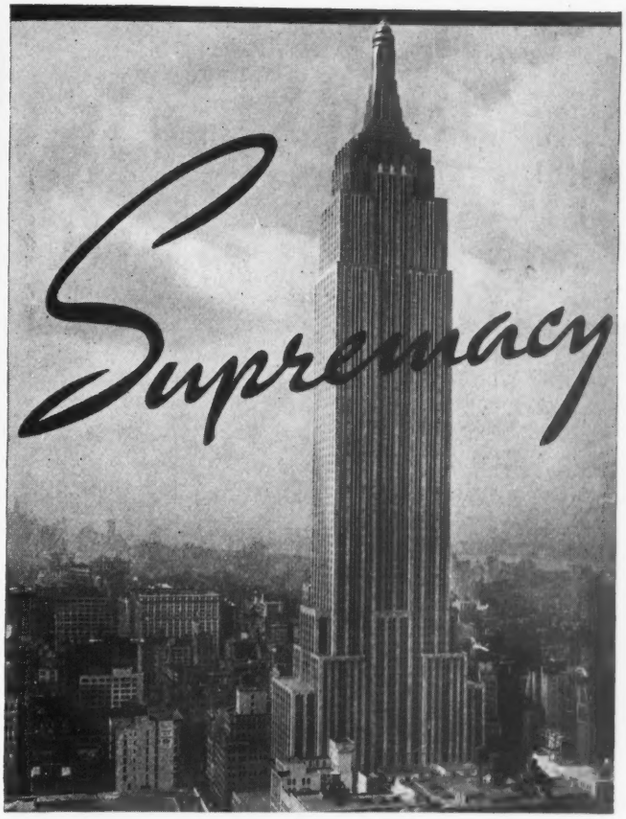
Replace Cracked, Worn Floors with DREHMANN FLOOR BRICK

A smooth, clean, sanitary Drehmann Floor will improve the appearance of your plant and greatly increase your production efficiency. Drehmann Floor Brick can be laid on top of old worn out floors with but little inconvenience. Proof against steam, grease, acids, and heavy wear. WRITE FOR BOOKLET.

DREHMANN PAVING & CONSTRUCTION CO.

N. W. Corner Gaul & Tioga Sts., PHILADELPHIA, PA.

545 Fifth Avenue New York, N. Y. | 11 Beacon Street Boston, Mass. | 205 W. Wacker Drive Chicago, Ill.



The Empire State Building, towering above the New York skyline, is a famous example of modern achievement.

ARABOL

GUMS · GLUES · PASTES

in their field, have gained a corresponding world-wide reputation for high quality and dependability.

Whether your requirements are large or small, simple or complicated, you can always depend on Arabol to supply the *right* adhesive for your particular purpose.

For information about special adhesives for Food Packers

ADDRESS DEPARTMENT F

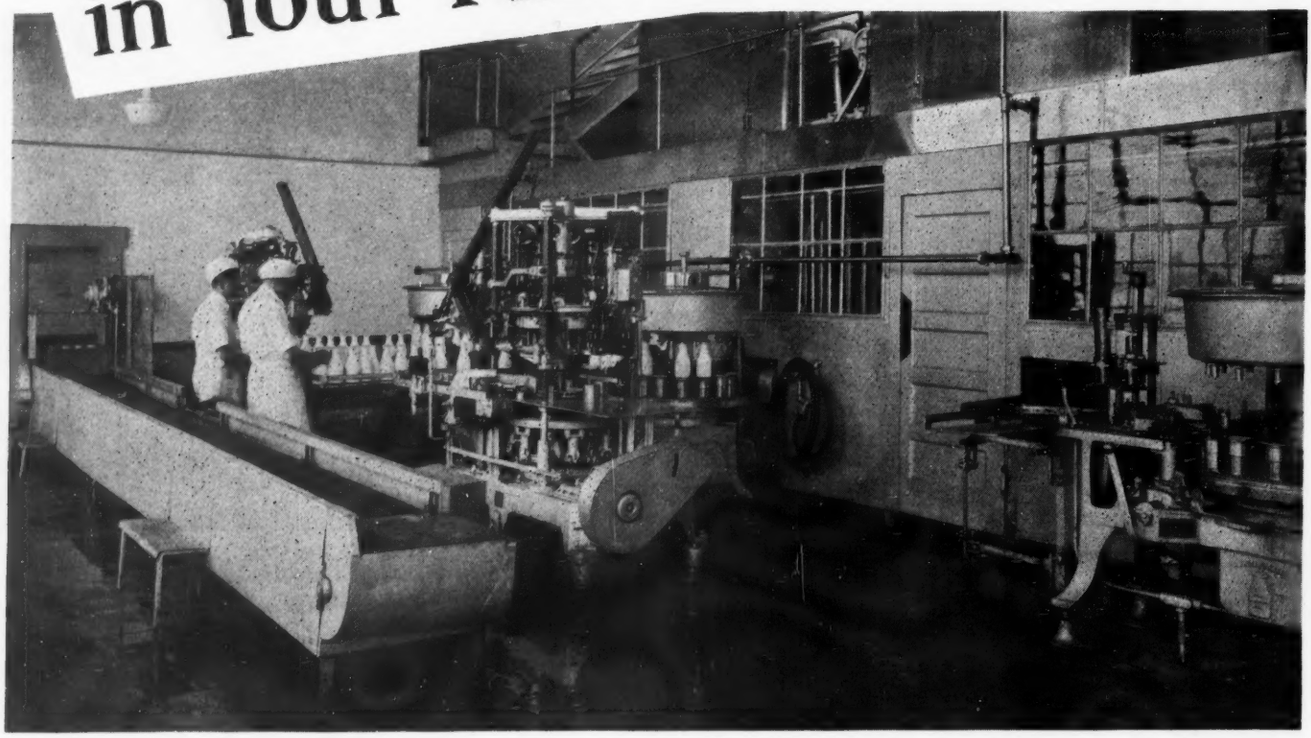
THE ARABOL MFG. CO.

110 East 42nd Street • New York

Chicago • Philadelphia • Boston

New Orleans • San Francisco • Seattle

How Clean is the AIR in Your Pure Food Plant?



You Can be sure it is CLEAN *with* "Buffalo" P. C. Cabinets . . Air Washers

Dust and germ-laden air has no place in a food plant, be it large or small.

Nor will you find such conditions in the hundreds of plants that have installed "Buffalo" P. C. Air Conditioning Cabinets, or "Buffalo" Air Washers. These modern, efficient, compact units completely clean and wash all the air that enters the plant.

Working conditions are much more healthful, and the food products themselves are produced under the most ideal conditions.

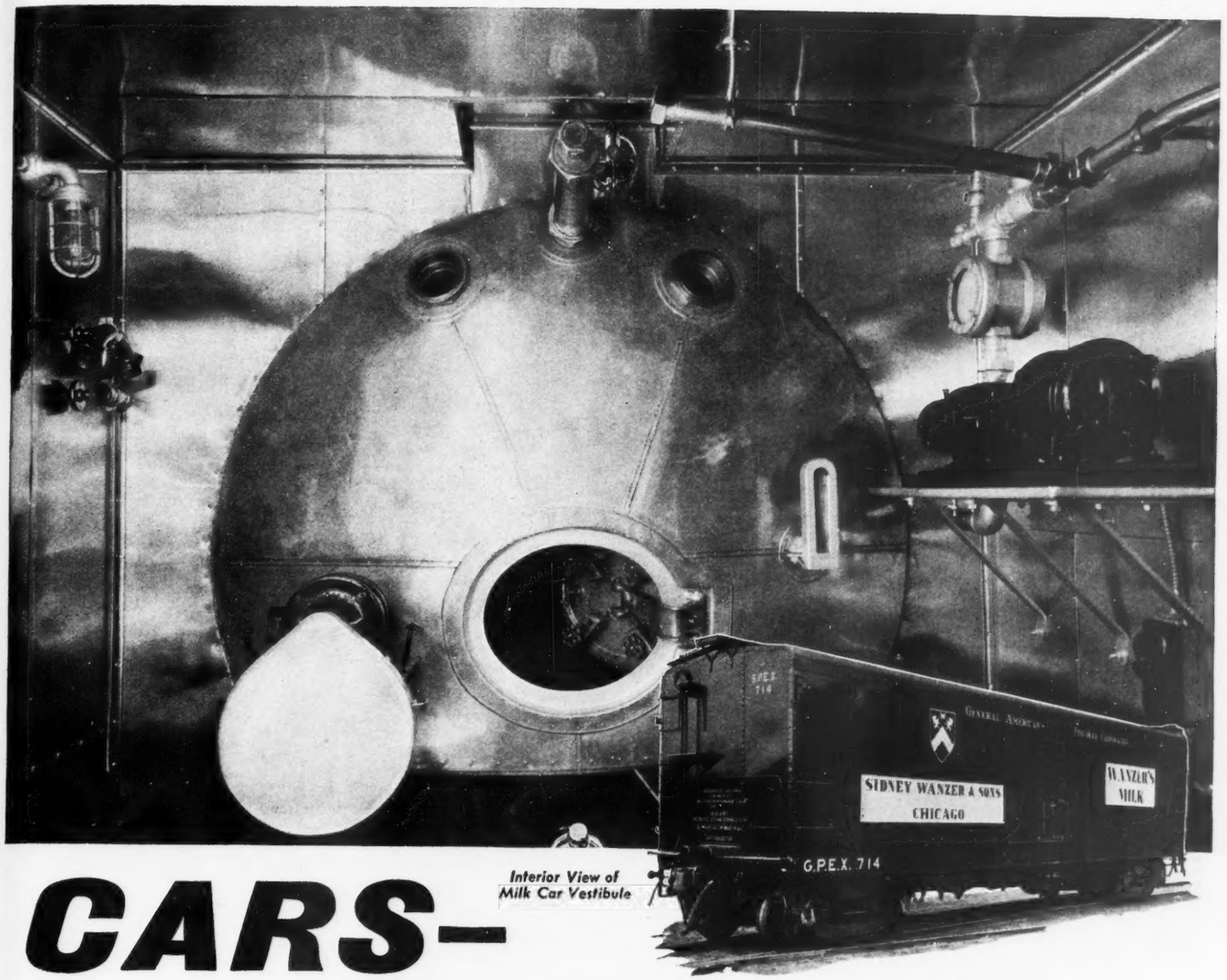
It will pay you well to investigate the advantages of "Buffalo" air washing and conditioning equipment.

Write today for Bulletin 501

Buffalo Forge Company

181 Mortimer St., Buffalo, N. Y.

Branch Engineering Offices in Principal Cities In Canada: Canadian Blower & Forge Co.. Ltd., Kitchener, Ont.



Interior View of Milk Car Vestibule

CARS—

that have revolutionized Transportation of DAIRY PRODUCTS!

The engineering departments of two great Corporations — General American Pfaudler Corporation, Subsidiary of the General American Transportation Corporation, and Ingersoll Steel and Disc Division of Borg-Warner Corporation — have collaborated in adopting IngAclad Stainless-Clad steel as a standard material for the lining of vestibules for tank milk cars. The gleaming polished stainless steel surfaces of the vestibules give added assurance of complete sanitation and cleanliness.

This is just one of the many applications IngAclad is finding in the Food, Chemical and other process industries. Investigate the economy and other advantages of IngAclad in manufacturing, handling, transporting and storing of products where sanitation and non-corrosion are vital. Write for illustrated folder showing wide variety of applications.

55 CARS

have already been built by General American Transportation Corporation, using . . .

INGACLAD *Trade Mark Reg.*

STAINLESS-CLAD STEEL

"A BORG-WARNER PRODUCT"

Pure stainless steel (18-8) on the surface in contact with the product, is inseparably welded to a layer of ordinary steel by the Ingersoll patented cast-in-the-ingot process—reducing the basic material cost as much as 50%.

Licensees of the IngAclad Process

Allegheny Steel Co., Brackenridge, Pa.
Granite City Steel Co., Granite City, Ill.
Samuel Fox, Ltd., Division United Steels, Ltd., Sheffield, England
Fried. Krupp, Essen, Germany

INGERSOLL STEEL & DISC DIVISION
BORG-WARNER CORPORATION
310 SOUTH MICHIGAN AVENUE, CHICAGO, ILLINOIS

INGACLAD GIVES STAINLESS PROTECTION AT LOWER COST

ANNOUNCING THE 1938 LINE OF FORD V-8 TRUCKS

INCLUDING A NEW *One-Tonner*

FORD OFFERS WIDE RANGE. FAMOUS V-8 ENGINE BRINGS NEW ECONOMY TO LOADS IN ONE-TON RANGE

THE Ford Motor Company has built more than four million trucks. With this great background of experience, it means something to say that the 1938 Ford V-8 Trucks are the finest Ford has ever built.

Here is the widest range of types and sizes in all Ford history. The big 134-inch and 157-inch wheelbase Ford V-8 Trucks are designed to do the work of heavier, more expensive units—and do it faster, at lower cost. An entirely new line of 122-inch wheelbase one-ton trucks has been added to bridge the gap between the larger trucks and the new 112-inch wheelbase commercial cars. For practically every hauling and delivery requirement there is now a unit that gives the high Ford standard of dependability and economy!

The 1938 line of trucks and commercial cars are all newly styled. They have an impressive new front end, a sturdy new grille, new headlamps, massive full-skirted fenders. Their smart, modern appearance is a definite asset to any business.

Other important advances for 1938 are a new 134-inch wheelbase in the big truck line . . . a new frame width for both the 134-inch and 157-inch wheelbase units . . . 7.50—20 dual tire and wheel equipment available at extra cost . . . improved brakes and easier steering . . . stronger construction in vital parts.

The new one-tonners and the commercial cars offer a choice of the 85 or 60 horsepower V-8 engine.

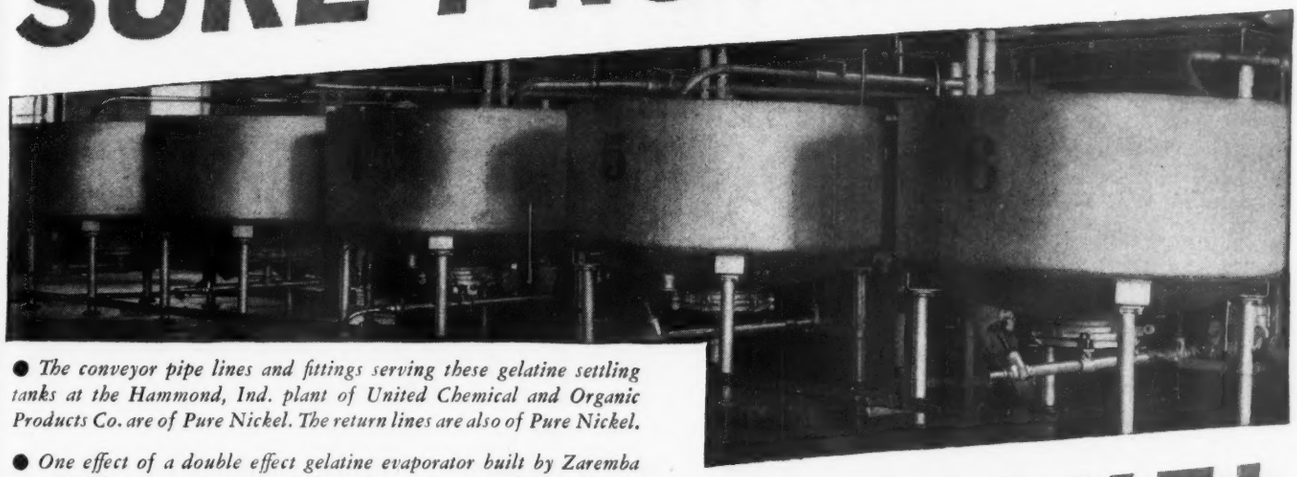
Your Ford dealer invites you to see the new line—and to make an "on-the-job" test with your loads and your driver.

LOW FIRST COST IS ONLY THE START OF FORD ECONOMY

FORD'S SEVENTH YEAR OF V-8 SUCCESS

Sensitive Products need

SURE PROTECTION

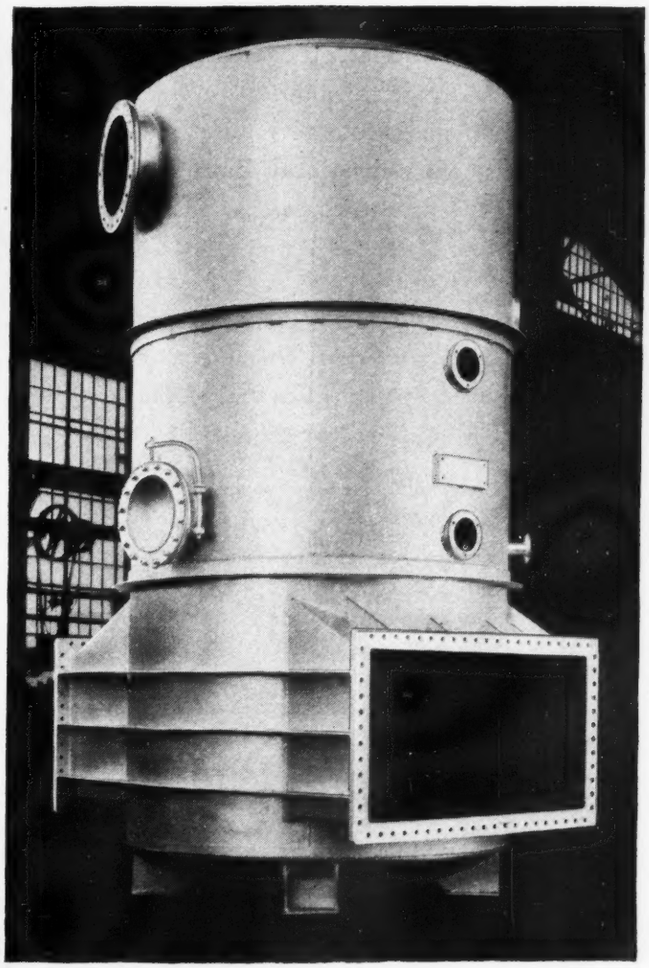


● *The conveyor pipe lines and fittings serving these gelatine settling tanks at the Hammond, Ind. plant of United Chemical and Organic Products Co. are of Pure Nickel. The return lines are also of Pure Nickel.*

● *One effect of a double effect gelatine evaporator built by Zaremba Co., Buffalo, N. Y. Constructed throughout of Pure Solid Nickel for the protection of high purity gelatine.*

...NICKEL

provides it!



From Evaporators through to Settling Tanks, Nickel guards Gelatine against harmful metallic contamination.

AT left is shown a large evaporator built for concentrating gelatine. Afterwards the product flows to settling tanks like the five illustrated above. And because gelatine is highly sensitive to metallic contamination, throughout processing it must be prevented from coming in contact with harmfully contaminating metals.

So where metal must be employed—as for evaporators, pipes, valves, heating coils, and handling equipment—Nickel is highly satisfactory. Strong, tough, durable and free from harmful contaminating effects, Nickel also has excellent heat transfer properties. These are the reasons why Nickel has for years proved outstandingly successful in the handling of many food products which, like gelatine, are highly sensitive to metallic contamination.

When contemplating the purchase or construction of equipment for this type of service, remember that Nickel *protects pure foods.* Write for additional information. Address:

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL ST., NEW YORK, N. Y.

SALES CLERKS GET INTRODUCED TO THE FLAX GARDEN

(*LINUM USITATISSIMUM*)

LINEN is a term that is understood by the trade and the public to designate a yarn or fabric made wholly of the fibres of the flax plant (*linum usitatissimum*). Partly through ignorance and partly through design, some manufacturers and merchants have recently used the word linen in the selling of garments containing no flax fibre whatever.

The National Better Business Bureau circulated a special nation-wide bulletin exposing these practices and giving educational information for the benefit of manufacturers, wholesalers, retailers and their sales clerks.

Of course, there were originally a number of specific complaints concerning this linen question, involving not only cotton and rayon, but even silk. These individual cases were followed up and threshed out from the various angles involved, and with great success in establishing equitable practices all round. But the broadest results of the Bureau's activities, in this and other cases, are to be found in the *preventive effect* of the Bureau's bulletins, broadcast through trade and publication channels and through its affiliation with fifty-five local Bureaus from coast to coast.

• • •

The National Better Business Bureau is a non-profit organization, serving business and maintained by business. It serves as a clearing house for complaints against frauds and practices unworthy of American business. Its services are available to all—to non-members as well as members—but its only income is from members' contributions.

In relation to your own business, you may find much of value in an intensive use of the Bureau's consultative facilities *and accumulated experience. Write for special report for executives. There is no obligation.*

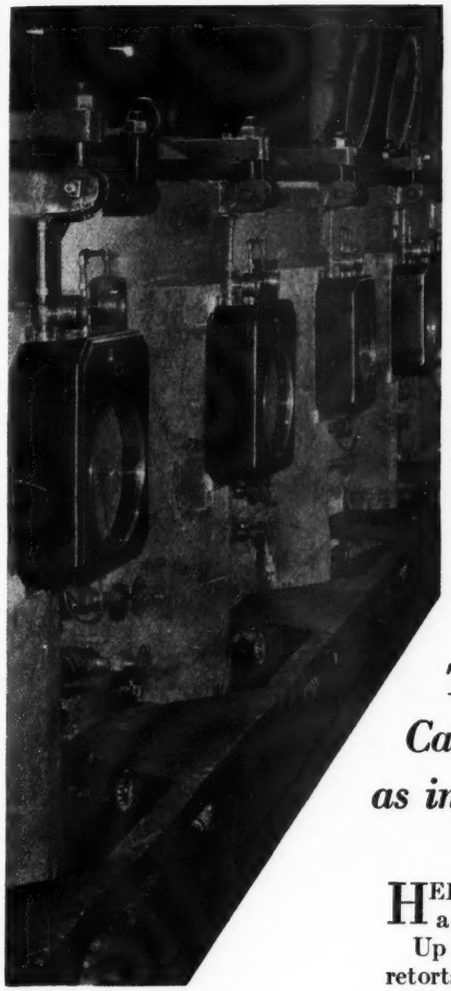
NATIONAL BETTER BUSINESS BUREAU, INC.

405 Lexington Avenue, New York City

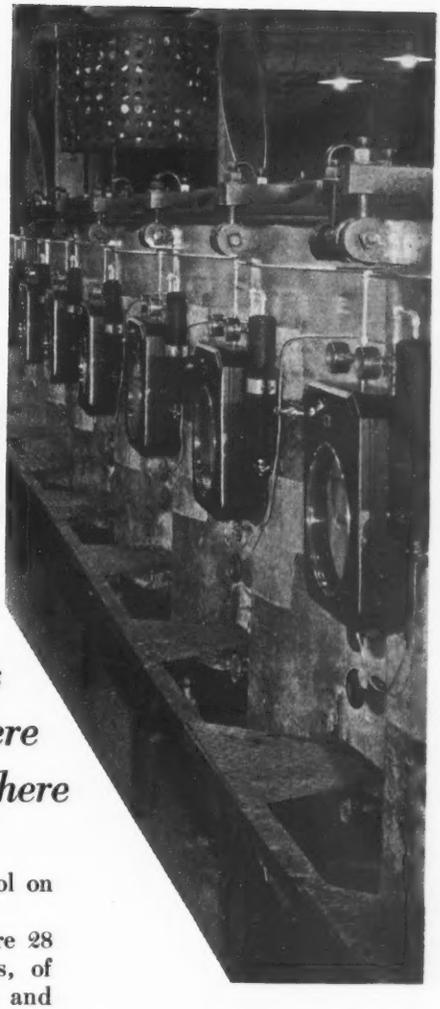
Please send me a copy of "....."

NAME..... FIRM NAME.....

ADDRESS..... CITY..... STATE.....



UP and DOWN THE AISLE

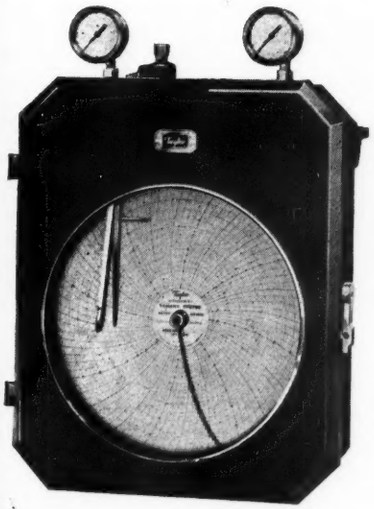


Taylor Control Guards Canned Meat Quality Here as in Food Plants Everywhere

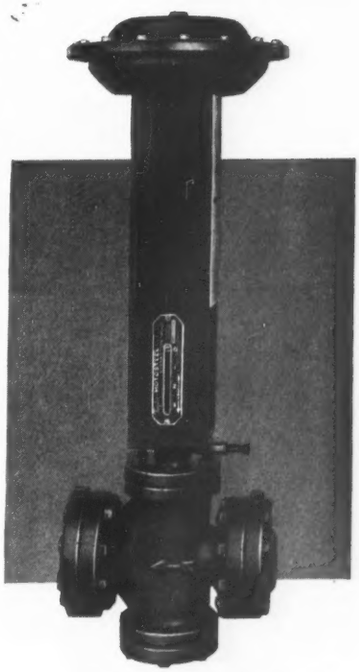
HERE is automatic temperature control on a large scale. And it's all Taylor.

Up and down one aisle alone there are 28 retorts and 28 Taylor Control Systems, of which Fulscope Recording Controllers and Motosteel Evenaction Valves are the basic instruments. These systems keep temperatures under exact control during cooking, eliminate damage to cans and glass, and reduce processing costs. They never fail to prevent waste and maintain production on a more exact schedule.

Throughout meat packing and canning plants, and every branch of the food industry Taylor Control is today considered as a standard of exact, efficient and economical regulation —not only of temperature, but also of pressure, humidity and rate of flow. Taylor Engineers will help you design and install a complete, coordinated system. For full information on what this means to you in money invested, in more efficient production, in better products, and in net profits, ask a Taylor Representative or write to Taylor Instrument Companies, Rochester, N. Y. Plant also in Toronto, Canada. Manufacturers in Great Britain — Short & Mason, Ltd., London, England.



This is the Taylor Fulscope Recording Controller that you will see in so many packing plants today, keeping temperature where it should be always. There's no finer instrument of its type available, and it pays for itself in a remarkably short time.



This Motosteel Evenaction Valve actuated by the Taylor Controller (across the page) is one of Taylor's finest modern developments ready now to meet the needs for tomorrow's production as well as today's.

Taylor

Indicating / Recording • Controlling

TEMPERATURE, PRESSURE, FLOW *and* **LEVEL INSTRUMENTS**

MATERIALS FOR THE FOOD MANUFACTURER

DIRECTORY

ADVERTISERS:

Key Number	*Page*
1—Callahan & Co. A. P.	This
2—Diamond Crystal Salt Co.	59
3—Eff Laboratories, Inc.	This
4—Fritzche Bros., Inc.	This
5—Pfizer & Co., Inc., Chas.	59
6—Stange Co., Wm. J.	This
7—Stein, Hall & Co., Inc.	This

	Advertiser's Key No.
Acetic Acid	1
Albumen	7
Citric Acid	5
Colors	4, 6
Corn Starch	7
Cream Tartar	5
Dextrines	7
Dry Essence of Spices	6
Egg Albumen	7
Egg Yolk	7

	Advertiser's Key No.
Essential Oils	4
Flavors	4, 6
Granulated Tapioca	7
Pearl Tapioca	7
Pro-Vitamin "A"	3
Rice Flour	7
Salt	2
Sodium Citrate	5
Soya Bean Flour	7
Spice Essential Oils	4
Tapioca Flour	7
Tartaric Acid	5

CAROTENE
(PRO-VITAMIN 'A')
formerly rare and expensive... now available in quantities at low cost.
Provatol (Eff Brand carotene) supplies this valuable health and resistance building food essential now added as a "fortifying" agent to several food and drug successes.
Write for literature and full particulars... no obligation.
EFF LABORATORIES, INC.
418-G Republic Bldg. • Cleveland, O.
Phone: CHerry 5644 • Cable: EFFLAB
"CAROTENE PRODUCTS BY THE GRAM OR CAR"

FLAVORS for POWDERED FOODS and DESSERTS
A Flavor for Every Purpose
Oftentimes a skillful combination of flavors will produce better effects than straight flavor. For years we have specialized in the flavoring of powdered foods and desserts. By permitting us to apply the experience thus gained to your problem it is quite possible we may succeed in producing a better or more economical flavor for your product. Consultation with us will involve no obligation.
FRITZSCHE Brothers, inc.
316 WEST 6TH STREET LOS ANGELES, CAL. PORT AUTHORITY COMMERCE BLDG.
Proprietors of PARFUMERIES de DELLANO Brothers, France
FRITZSCHE BROTHERS of Canada Ltd. 77 Wellington St. Toronto, Canada
76 NINTH AVENUE, NEW YORK, N.Y.
110 WEST OHIO ST. CHICAGO ILL.

FRUIT PECTIN
The Baker and Confectioner find uses for Pectin in fillings, icings, gums, etc. The Canner and Preserver of fruit products can't get along without it.

PEACOCK BRAND
FOOD PRODUCTS SPECIALTIES
Actual Producers of
CERTIFIED FOOD COLORS
Manufacturers of
DRY ESSENCE OF NATURAL SPICES
For condimentation of all food products
Also a complete line of
FLAVORING MATERIALS
Wm. J. Stange Co.
CHICAGO

Tapioca Flour
Pearl Tapioca
Granulated and Flake Tapioca
Egg Albumen
Egg Yolk
Corn Starch
Rice Flour
Soya Bean Flour
Pure Food Dextrines
STEIN, HALL & COMPANY, Inc.
285 Madison Avenue, New York
Est. 1866
Boston Philadelphia
Providence Charlotte
Chicago Toronto
Rochester Buffalo
San Francisco Los Angeles

PURE VINEGARS
A. P. CALLAHAN & COMPANY
2407 SOUTH LA SALLE STREET
CHICAGO, ILL.

SUGAR
In all its grades and colors, approximately 3 and ½ billion pounds of sugar are used annually by manufacturers thruout the food field.

RYERSON Certified STEELS

NEW BOOK Features Aid to Steel Users

• Ryerson has always carried only the higher quality steels. Now, after years of planning, they bring you Certified Steels—steels of known quality—with year after year uniformity. Special quality and service features help users secure best results. For instance, alloy bars are of selected chemical analysis. They are tested for heat treatment response. Complete data on every bar is sent the customer to guide in treating the steel. We believe you will be interested. Write for booklet F-6 which tells the complete story. Joseph T. Ryerson & Son, Inc. Plants at: Chicago . . . Boston . . . Milwaukee . . . St. Louis . . . Cincinnati . . . Cleveland . . . Buffalo . . . Philadelphia . . . Detroit . . . Jersey City.

RYERSON Certified STEELS

MATCHLESS•

...as the work of the old masters!

CITRIC ACID
POWDERED CRYSTAL GRANULAR

TARTARIC ACID
POWDERED CRYSTAL GRANULAR

SODIUM CITRATE

CHAS. PFIZER & CO., INC

PFIZER QUALITY

81 MAIDEN LANE, NEW YORK
444 W. GRAND AVE., CHICAGO

MANUFACTURING CHEMISTS . . . . EST. 1849

CREDIT WHERE CREDIT IS DUE

I JUST GOT MY PAY CHECK. THANKS FOR THE RAISE, BOSS.
YOU DESERVE IT, TOM. YOU'RE THE BEST PRODUCTION MAN WE'VE EVER HAD
YOU'RE MAKING US A MUCH BETTER PRODUCT
THANKS. BUT A LOT OF THE CREDIT GOES TO DIAMOND CRYSTAL
YOU MEAN SALT CAN MAKE ALL THAT DIFFERENCE?
SURE. WE NEEDED A SALT THAT WOULD WAKE UP THE HIDDEN FLAVORS
DIAMOND CRYSTAL SALT
AND SO WE CHANGED TO DIAMOND CRYSTAL
THEN ALL THE MORE CREDIT TO YOU FOR IMPROVING OUR PRODUCT SO SIMPLY, AT NO ADDED COST

You're proud of the product your company makes. You use the finest ingredients, carefully blended and processed. These fine ingredients deserve the one salt that will develop their flavors to the full—Diamond Crystal Alberger Process Salt. It's a mild, soft, porous-flake salt, always uniform, always dependable. It's "got everything" for your product—premium performance at no extra cost! Diamond Crystal Salt Co., Inc., St. Clair, Michigan.

DIAMOND CRYSTAL *Alberger Process* SALT

The Salt that "WAKES UP HIDDEN FLAVORS"

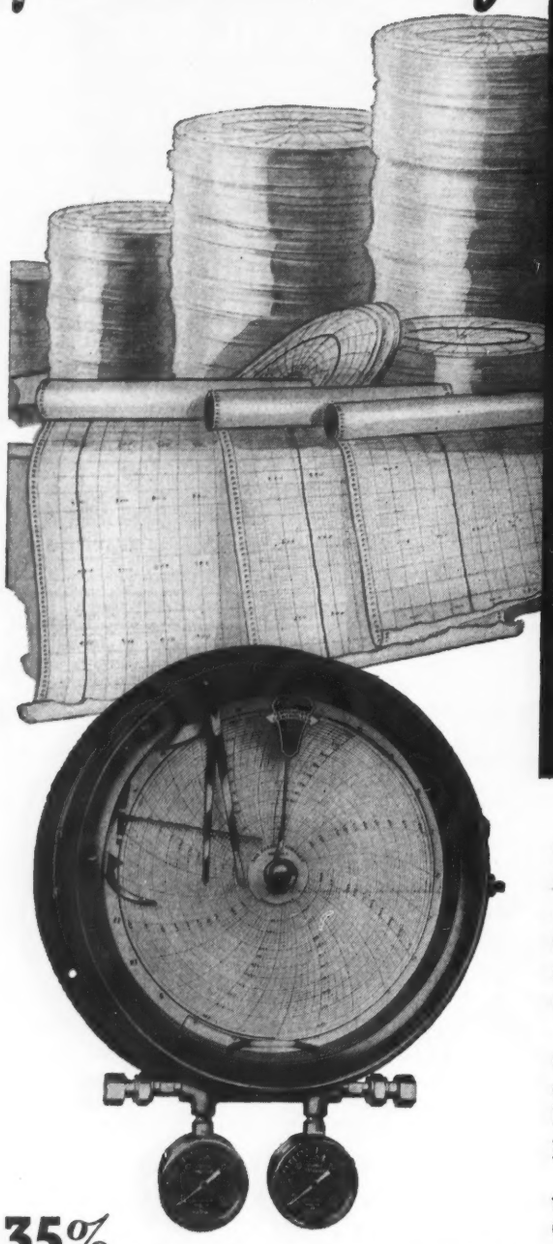
MILLIONS OF CHART RECORDS

prove that for . . .

65%

of all temperature problems nothing will produce as good *control* as a simple

FOXBORO "Open and Shut" Controller



35% of control problems cannot be handled by "Open and Shut" Control. To satisfy specific problems involving varying amounts of throttling range Foxboro perfected the Stabilog Controller. It does a perfect job on the 35%. Each type of Foxboro Controller has its definite place. Foxboro engineers will gladly help you.

Temperature control is really simple . . . and inexpensive . . . in 65% of all cases. We have nature to thank for that and millions of chart records substantiate this conclusion. It's due to the fact that 65% of all temperature control jobs have conditions that are favorable for automatic control. Typical of this group are the controls for vats, kettles, ovens, kilns and furnaces.

Annealing the giant 200-inch glass mirror for the world's largest telescope might seem a complicated control job. Temperature control had to be precise. Price was no consideration. A simple Foxboro "Open and Shut" Control was selected . . . and did a perfect job!

Don't let any control problem in your plant confuse you. In the twenty-five years since Foxboro pioneered the "Open and Shut" Controller it has accumulated a wealth of experience in the solution of every kind of control problem in every industry. Have a Foxboro representative study your control problems. If yours is one of the 65%, a simple Foxboro "Open and Shut" Controller will save you money and assure *certified* results. The Foxboro Company, 30 Neponset Avenue, Foxboro, Massachusetts, U. S. A. Branch Offices in 25 Principal Cities.

FOXBORO *Certified* **TEMPERATURE CONTROLLERS**

REG. U. S. PAT. OFF.

2 Men • • •
250 Lbs. of Perfect Potato Chips Per Hour!

Here is the machine that put potato chip making in the "big business" class. A complete and fully automatic unit of tremendous profit-making ability for any food manufacturer interested in greater output or lower production costs.

CONTINUOUS FLOW OF CHIPS

Inspection of the peeled potatoes is the only hand operation. After that the Ferry Machine automatically converts them into dry, crisp, delicately salted chips of *unvarying high quality* the year 'round. No odors, no waste, no alibis—and a product you can guarantee without reservations.

USERS MOST ENTHUSIASTIC

One of many Ferry Machine owners writes: "We produce a better chip from all grades of potatoes at less cost than ever before in our history. . . Our two machines turn out an average of more than 500 lbs. of salted finished chips per hour, and our business has increased to the extent that we are now considering a third machine." (Name on request.)

Get complete data on this revolutionary machine today and be the first in your territory to corner the quality chip market. The coupon below is for your convenience.

J. D. FERRY

MANUFACTURER OF CONTINUOUS AND AUTOMATIC POTATO CHIP MACHINERY, SLICERS AND AUTOMATIC SLICER FEEDERS, CAN-WASHING MACHINERY CONTINUOUS PRETZEL-COOKING, SALTING, OVEN-LOADING AND PRETZEL STICK MACHINERY

HARRISBURG, PENNA.

J. D. FERRY, HARRISBURG, PENNA.
129 South Cameron St.

Please send complete data on your ( ) Automatic Potato Chip Machine ( ) Continuous Pretzel Cooking Apparatus ( ) Vegetable Slicers ( ) Can-washing Machines.

Name .....

Firm .....

Address .....

FOOD INDUSTRIES

SERVICE SECTION

Materials, Equipment & Supplies for the Food Processing Industries

"HECK" Findley's STICKY GUY
JERRY KEEFE.
DON'T BUILD FIRES
DON'T YOU BELIEVE IN SIGNS, MISTER
BUT, ER, WARDEN, I WAS ER, JUST
TELL IT TO THE JUDGE HE WILL ENJOY IT!
I GOT CAUGHT BUILDING A FIRE, DEAR
THEY CAN'T PUT YOU IN JAIL FOR THAT.
THE HECK THEY CAN'T
Pastes-glues-gums for every purpose—adhesive needs intelligently analyzed . . .
Write for samples and prices
The F. G. Findley Co.
Manufacturers of
PASTES, GLUES and GUMS
MILWAUKEE, WISCONSIN

PATTERSON
TYPE "E" MIXER with Unipower Drive and "TD" Stirrer
For blending—dissolving — emulsifying — heat transfer, etc. . . available in any required size — Belt or Motor Driven.
The Patterson Foundry & Machine Co.
East Liverpool, Ohio, U. S. A.

PROFESSIONAL SERVICES

Consulting—Plant Design—Research—Testing
Chemical, Bacteriological and Nutritional Analyses

THE Service Section of Food Industries supplements other advertising in this issue with these additional announcements of products and services essential to modern plant operation. Make a habit of checking this page each issue.

Skinner & Sherman
Incorporated
Chemists and Bacteriologists
Analyses, Research, and Consultation on Foodstuffs and Manufacturing Processes.
246 Stuart Street
Boston, Mass.

FOOD RESEARCH LABORATORIES, Inc.
RESEARCH—ANALYSES CONSULTATION
Specialists in Vitamins
WRITE FOR "SCIENCE AT YOUR SERVICE"
114 E. 32nd St., NEW YORK

Mortimer M. Gibbons
Sanitary Chemist
Water Analyses and Purification
Industrial Wastes Treatment
961 Frelinghuysen Ave., Newark, N. J.

PEASE LABORATORIES, Inc.
Food Processing, Nutritional, Chemical and Bacteriological Research
39-41 West 38th St., New York City

ARTHUR VAN HEEDEN
Consulting Chemist to the Food Industries
Manufacturing Processes,
Formulae, Research
1410 East 54th St., Chicago, Ill.

• WRITE TODAY • **A number of foresighted manufacturers are spending money in these pages to tell you about their products and service. These men are justifying their faith in advertising. Pull along with them by finding out what they can do to help you. Advertised products are dependable products.**

ALWAYS IN THE SPOTLIGHT

The name Powell has always been in the spotlight. Fine workmanship and built-in stamina have made Powell bronze valves the first consideration of the plant engineer.

Our technical department will gladly assist you in your valve problems.

POWELL VALVES

THE WM. POWELL CO. CINCINNATI, OHIO

SEARCHLIGHT SECTION

EMPLOYMENT : BUSINESS : OPPORTUNITIES : EQUIPMENT—USED or RESALE

UNDISPLAYED—RATE PER WORD:

10 cents a word, minimum charge $2.00.

Positions Wanted (full or part-time salaried employment only), ½ the above rates, minimum $1.00 an insertion, payable in advance.

Proposals, 40 cents a line an insertion.

INFORMATION:

Box Numbers in care of our New York, Chicago or San Francisco offices count 10 words additional in undisplayed ads. Replies forwarded without extra charge.

Discount of 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH:

1 inch $5.00
2 to 3 inches ..... 4.75 an inch
4 to 7 inches ..... 4.50 an inch

Other spaces and contract rates on request.

An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page. Food Industries

Copy for new advertisements must be received by December 22nd for the January issue

POSITIONS VACANT

FOOD CHEMIST with experience in making up formulas for bakeries and checking bakery products. Must have had considerable experience in bakery products and know the chemistry of baking. Exceptional opportunity open with national concern doing large business. Write giving full information on schooling, experience, references and minimum salary expected. P-338, Food Industries, 330 West 42nd Street, New York City.

CHEMIST. State all details education, experience, age, lowest salary; describe background fully. Post Office Box 3455, Philadelphia, Penna.

POSITION WANTED

FOOD CHEMIST—Mature. Formerly Chief of Laboratory in Field Station, Bureau of Chemistry, U. S. Dept. of Agriculture. 15 years' experience manufacture, control, executive large flavoring extract, etc., concern. Chairman Research Committee. Excellent references. East preferred. PW-337, Food Industries, 330 West 42nd Street, New York City.

SELLING OPPORTUNITIES OFFERED—WANTED

Selling Agencies—Sales Executives Salesmen—Additional Lines

OPPORTUNITIES WANTED

HAVE YOU a place in your organization for a young sales executive who has proven successful in developing profitable merchandising and advertising ideas; has efficiently organized, operated, and built sales forces; has had excellent business experience in wholesale and chain store distribution, and has a large valuable acquaintance among the food and confectionery buyers, the chain stores, and wholesalers; experienced in conducting advertising and specialty work campaigns; hard worker, applies force, initiative, ingenuity, purpose, and action. Has held sales executive position with large food manufacturer, now desires a change in connection with manufacturer who offers opportunity for a producer. Experienced in food products, cookies, crackers, and confections. Will furnish the very finest references. SA-334, Food Industries, 520 No. Michigan Ave., Chicago, Ill.

ENGLISH RANGOON buying house desires contact manufacturers (only) of low-priced canned foodstuffs. Send export list. RA-336, Food Industries, 330 West 42nd Street, New York City.

FOR SALE

10, 30 and 40 gal. Aluminum Stills.
60 & 85 H.P. Boilers, "Economic Type."
300 gal. Stainless Steel Vats, 44"x96"x20".
200 and 500 gal. Pfaudler Tanks, jkt., agit.
No. 3 Beach Russ Monel Vacuum Pump.
2000 gal. Pfaudler Tank, jkt., agit.
300 gal. Elyria Tank, 60"x24" agitated.
6x6 Gardner Air Compressor, 15 H.P. motor.
60, 100, 250 and 400 gal. Homogenizers.
60, 100, 450 and 800 gal. Viscolizers.
100, 150 and 170 gal. Copper Jacketed Kettles.
Barrel Type Heater, 36—1½" T.C. tubes.
4 ft. to 7 ft. dia. Copper Vacuum Pans.

Large Stock of Refrigerating Machinery, also Milk and Ice Cream Plant Equipment.

Send Us Your Inquiries

ROBERT P. KEHOE MACHINERY COMPANY
1 East 42nd Street, New York, N. Y.

OUTSTANDING MACHINERY OFFERINGS From 24 FOOD PLANTS LIQUIDATED—1937

2-bag **Lambert gas fired Roasters**, with 2 H.P. motor and one 4-bag cooling trough.
4-bag **Jabez Burns gas fired Roasters**, belt and motor driven, with two 4-bag cooling troughs.
Sprague Sells and Zastro 40x72 3-basket Retorts.
A. K. Robbins horizontal Retorts and trucks.
Sprague Sells 4 and 6 piston fillers.
Filler Machine Company 4-piston fillers, monel fittings and rising tables.
Kiefer rotary gear and piston Visco fillers.
Buffalo and Smith Food Choppers.
McDonald and Weeks automatic Labelers.
Semi-automatic Labelers; Burt and Knapp Can Labelers.
Kettles, aluminum, copper, stainless steel, and monel metal, jacketed 5 to 400 gallon capacity.
MISCELLANEOUS—Boilers, dough mixers, sifters and mixers, portable agitators, homogenizers and viscolizers, pulverizers, bucket elevators, centrifugal, rotary, vacuum, and piston pumps, etc.

Send for Complete Illustrated Booklet

FIRST MACHINERY CORPORATION

419 Lafayette St., N. Y. FMC GRamercy 7-6622

MODERN GUARANTEED SPECIALS

2—Glasscote 330 gal. cap. glass lined tanks—jacketed—with motor driven agitators.
Karl Kiefer 8 Spout Filler.
4—Elgin rotary, 8 spout, bronze Can and Jar Filling Machines with motors.
3—Karl Kiefer Visco Filling Machines.
Pfaudler glass lined Tank, 50 to 500 gal. capacity.

REBUILT EQUIPMENT UNION

World and National Bottle Labelers.
Stokes Rotary, Type D, Tablet Mach.
Dough type Mixing Machines, single and double arm, 1 to 10 bbl. capac.
Copper Steam Jacketed Kettles, 10 to 200 gal. capacity with and without agitators, tilting and stationary.
Copper Coating Pans, with and without steam coils.
Refrigerating Machines, 1 to 50 ton capacities, also Air Conditioning Equipment, all types and sizes.

Rebuilt Machinery

WE PAY CASH FOR SINGLE MACHINES OR ENTIRE PLANTS

Write or Wire Collect For Prices and Information

UNION STANDARD EQUIPMENT CO.
318-322 Lafayette Street NEW YORK, N. Y. Cable Address—"Confecmach"

STAINLESS STEEL KETTLES

ALL TYPES—ALL SIZES

BRIGHTON COPPER WORKS, INC.
2159 Kindel Ave. Cincinnati, Ohio

FOR SALE

USED - AUTOMATIC NET WEIGHER

Suitable for measuring 2 to 6 oz. loads of powdered material. Includes control for co-ordinating with packaging machine. Price—$300. May be inspected at

THE FRED GOAT CO., INC.
314 Dean St., Brooklyn, N. Y.

FOR SALE

2—Pneumatic Scale, **PACKAGING UNITS**, consisting of Carton Feeder, Top and Bottom Sealer, Two-stage Weigher and Wax Liner Unit.
2—Pneumatic Scale very late type **WAX LINER UNITS.**

Consolidated Products Co., Inc.
13-17 Park Row New York, N. Y.

Tin Can Machinery For Sale

1—¼ lb. Cameron Double Seamer
1—¼ lb. Bliss Bodymaker
1—McDonald Curling and Stacking Machine
1—1 lb. Bliss hemming machine

FS-335, Food Industries
330 West 42nd St., New York City

Good Used Power Equipment

Immediate Delivery—Substantial Savings
Boilers, Engines, Turbines, Generators, Motors, Compressors, Pumps, Transformers, Condensers, Converters, Fans, Speed Reducers, etc., etc.

Write for free copy of nationally advertised lists of equipment now available.

Departmental Advertising Staff
McGraw-Hill Pub. Co., 330 W. 42d St., New York, N.Y.

Guaranteed Rebuilt Equipment

Visit us—Suite 1403-4, Hotel Lexington, N. Y. City, during Chemical Show—Week of Dec. 6th-11th.

500 Ton **Hydraulic Crackling Press.**
5—**Burt & Knapp can labelers.**
5—**World, Ermold & National labelers**
3—**Karl Kiefer Rotary Visco Fillers,** gear and piston type, motor driven.
5—**Cake and Mayonnaise mixers, Hobart, Day, Read & Century** makes
Dry Powder mixers, with and without sifters, lab. size to 4000 lbs. cap.
Copper steam Jack. kettles 5 to 500 gal.
1—**Day Jack. "Jumbo"** 1200 gal. mixer.
2—**World Rotary Automatic Labelers.**
3—**B & S Jack. Digesters or Rendering Kettles,** 10x3'.
1—1000 lb. twin screw, **Hottman Mixer.**
1—48"x40" **Buffalo Flaker.**
1—**Bufflovak,** type F. 20 **Vacuum Shelf Dryer.**
1—350 gal. Copper Steam Jacketed **Vacuum Pan.**
1—Ferguson Packomatic **Filler and Weigher.**
2—**Redd Powder Carton Filling, Weighing, Sealing Units**—adjustable, 50 per minute.
1—200 gal. **Pfaudler Closed Glass Lined St. Jack. Kettle.**
Aluminum steam jack. kettles 10 to 175 gals. cap.

SEND FOR "CONSOLIDATED NEWS" listing complete stock.

WHAT HAVE YOU FOR SALE? SEND US A LIST

CONSOLIDATED PRODUCTS COMPANY, INC.
13-17 PARK ROW, NEW YORK CITY
Shops and Warehouse - - - 335 Doremus Avenue, Newark, N. J.

BUY WITH CONFIDENCE
"CONSOLIDATED"

FOR SALE

Triangle Bag Filler, Class SK.
Sprague-Sells Steam Retort No. 1.
Read, Hobart and Day Vertical Mixers.
Blakeslee Potato Peeler.
Kelvinator Ice Cream Cabinet 12 hole.
Schultz-O'Neil Dustless Sugar Pulverizers.
50 and 125 gal. **Aluminum Jacketed Kettles.**
10 gal. to 300 gal. **Copper Jacketed Kettles.**
2 ton **York,** 3 ton **Frick,** 7 ton **Lipman Refrigerating Machines** all self-contained; also 5 and 7 ton **York Ammonia Compressors.**

SAVAGE BROS. CO.
2632-46 Gladys Ave. Chicago, Ill.

FOR SALE

1—30" **Oehmig Peanut Butter Mill.**
1—250 gal. **Glass Lined Tank** with ag.
5—**M & S and Ayars Can Fillers.**
75—**Copper and Aluminum** st. jac. **Kettles,** 20 to 250 gal. with and without agitators, stationary and tilting.
3—**Filler Machine Co. Filling Machines.**
2—**Kiefer Visco Filling Machines.**
3—**U. S. and Kiefer Bottle Rinsers.**
5—**Bottle and Can Labeling Machines.**
10—**Hobart, Read, Triumph Mixers. Dough and Powder Mixers, Bottle and Can Fillers, Filters, Filter Presses, Mills, Dryers, Pumps, Boilers, etc.** Send us your inquiries, also your list of surplus equipment, which we purchase for cash.

LOEB EQUIPMENT SUPPLY CO.
914 N. Marshfield Ave., Chicago, Ill.

NEW ADVERTISEMENTS

must be received December 22nd, 10 A.M. to appear in the issue out the following month

Address copy to the Departmental Advertising Staff
FOOD INDUSTRIES, 330 West 42d St., New York City

NEW AND USED
Steam Jacket, Copper Kettles
20 to 300 gal. capacity.
THOS. BURKHARD, INC.
494-496 Flushing Ave., Brooklyn, N. Y.
Coppersmiths Since 1836

Food Industries

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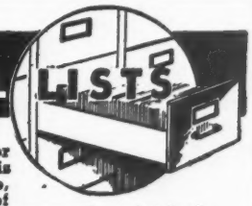
First advertising forms for the January Issue close December 10th. Your assistance in getting copy to us on or before this date will be appreciated.

Advertising Dept.

McGRAW-HILL
DIRECT MAIL LISTS



As business paper publishers for over fifty years, McGraw-Hill is uniquely equipped to offer complete, authoritative direct mail coverage of Industry's major markets. Extreme accuracy is maintained (guaranteed to 98%) and through careful analysis of markets, complete classification of companies and personnel, etc., the widest possible selections are available. Send for handy reference folder "Hundreds of Thousands of Reasons Why" which describes how McGraw-Hill Lists are built and maintained.

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Electrical Construction
Electrical Industry
Food Industries
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Metal Working Industries
Process Industries
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Administrative Executives
Electrical Dealers & Wholesalers
Mill Supply Houses
Power Services
Product Engineering & Design
Production and Maintenance
Radio Dealers & Wholesalers
Radio Engineering & Design

For further details, selections from above basic classifications, counts, prices, etc., or estimates on special lists . . . ask any representative or write to

DIRECT MAIL DIVISION....
McGRAW-HILL PUBLISHING CO.
330 W. 42nd STREET NEW YORK, N. Y.

. . . Complete lists covering industry's major markets

Points you'll want to know about Food Industries

The Foremost Business Paper Covering the Food Field

EDITORIAL SCOPE

FOOD INDUSTRIES is published for the purpose of providing an authentic medium for the exchange of practical ideas by the manufacturers of food. It covers not only the actual making of the product, but also the proper packaging, merchandising and distributing of it.

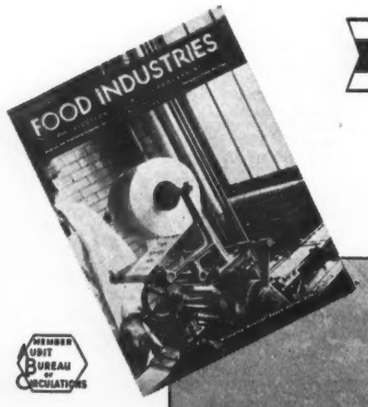
Special departments, in addition to well illustrated, carefully selected articles, keep the reader informed on Everyday Operating Problems, New Discoveries and Inventions, New Equipment, and New Packages and Products. Then, too, FOOD INDUSTRIES has pioneered in the food field a series of special sections, each discussing a separate Unit Operation common to all food manufacturing. These appear in the form of 12 or 16 page tinted sections.

FOOD INDUSTRIES' Editor-in-Chief is Dr. Laurence V. Burton. G. L. Montgomery is Managing Editor, with Ivan C. Miller as Distribution Editor, and E. S. Stateler (in Chicago) and F. K. Lawler, Associate Editors.

MARKET DEFINITION

$9,510,674,624 worth of all kinds of food products are produced annually by the country's 48,681 food manufacturing establishments. Approximately 10,000 of these food plants produce over 90% of the total production volume. It is in these worthwhile concerns (each with an annual volume that exceeds $100,000) that FOOD INDUSTRIES' circulation is concentrated. As a result, advertisers in FOOD INDUSTRIES are assured of economical coverage of practically 90% of the productive capacity of the food field.

Look for Our Detailed Story
IN THE 1937 ABP BLUE BOOK



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FOOD INDUSTRIES

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Preparing milk and milk products for market—

This thoroughly modern work deals both with the scientific and practical methods of testing dairy products and preparing them for the market.

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Milk and Milk Products

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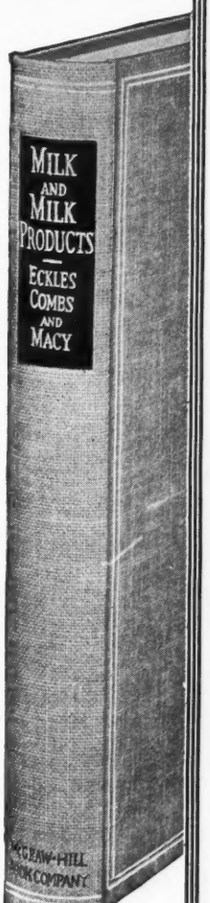
and HAROLD MACY
Associate Professor of Dairy Bacteriology, University of Minnesota



EVERY subject of immediate importance to the dairyman is treated in a practical and authoritative manner in this new book. Special attention is given to the composition and properties of milk and the factors, such as bacteria and micro-organisms, which influence these characteristics. Emphasis is placed upon the sanitary production of milk and the value of dairy products to the human diet.

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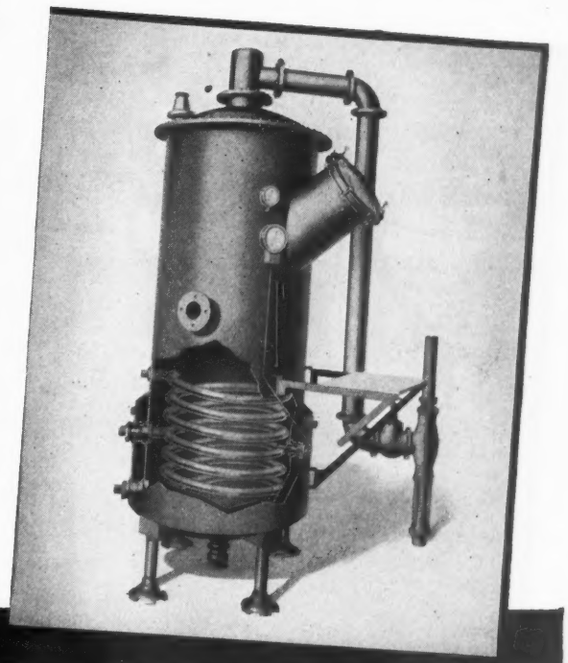

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Look for Our Detailed Story

IN THE 1937 ABP BLUE BOOK

FOOD INDUSTRIES

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Better . . because
IT'S STAINLESS STEEL

THIS milk cooler is better because hundreds of feet of stainless steel tubing guard the purity of the milk by keeping it from any metal that can rust or tarnish. Stainless steel retains a bright surface and can be washed as easily as glass. It remains easy to clean indefinitely.

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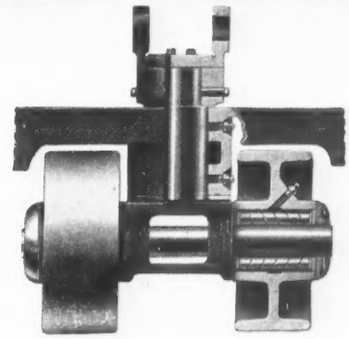
Find out how much Yale Efficiency—Speed—and Safety can save YOU. Call in our representative—He'll tell you in dollars and cents.



Cut open view of the rugged front end construction. Front wheels equipped with over-capacity roller bearings mounted on axle of high carbon chrome manganese steel. Axle Key eliminates wear—hardened steel thrust washers on either side of wheels assure maximum life. ONE OF THE REASONS YALE TRUCKS LAST A LIFETIME!

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One of ten chassisless semi-trailers built of Alcoa Aluminum Alloys by Aluminum Trailer Co. for York Motor Express, York, Pa. Constructed of heavy materials, weight was 8,800 lbs. Weight in Aluminum, 5,270 lbs.

Another trailer saves with MONOCOQUE *Design*

Alcoa Aluminum Alloys used for Chassisless Construction

CUT DEADWEIGHT 40%

350 ton-miles of hauling cost* are saved every day by this unit. Here's why:

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2. The trailer is built of light, strong Alcoa Aluminum Alloys.

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Light, strong alloys of Alcoa Aluminum are ideally suited to the needs of this chassisless design. Panels and members can be made thick and sturdy, thoroughly safe. Yet Aluminum parts are inherently light.

That's why this trailer, belonging to York Motor Express, weighs only 5,270 lbs., which is 3,530 lbs. less than a previous job built of heavy materials. A *Bonus Load*, can be carried in place of deadweight removed — OR, a smaller tractor can be used to haul the lighter trailer. The latter is York's choice.

Our experts will be glad to tell you more about alloys of Alcoa Aluminum, how they are used to cut trucking costs, how they fit *Monocoque* design. Write to: ALUMINUM COMPANY OF AMERICA, 2152 Gulf Building, Pittsburgh, Pennsylvania.

*Figured on gross weight.

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...and there goes the profit on that trip!

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